

Exhibit A

to

Complaint for Patent Infringement

The '786 Patent



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Epstein et al.

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(54) **SYSTEM AND COMPUTER METHOD FOR VISUALLY GUIDING A USER TO A CURRENT INTEREST**

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G06F 17/30 (2006.01)
H04L 29/08 (2006.01)
G06F 3/0484 (2013.01)
G06Q 30/06 (2012.01)

(52) **U.S. Cl.**

CPC G06F 17/30268 (2013.01); G06F 3/04842 (2013.01); G06Q 30/0631 (2013.01); H04L 67/306 (2013.01)

(58) **Field of Classification Search**

USPC 705/26, 27
IPC G06Q 30/0631
See application file for complete search history.

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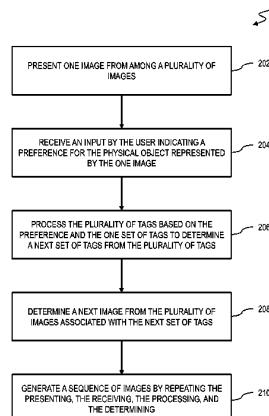
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(57) **ABSTRACT**

System and computer-implemented method of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user is disclosed. An image from among a plurality of images is presented on an electronic display. The image is associated with a set of tags. An input is received indicating a user's preference for the image. A plurality of tags is processed based on the preference and the set of tags to determine a next set of tags from the plurality of tags. A next image is determined from the plurality of images based on the next set of tags. The next image represents a physical object, different from a physical object represented by the previous image. A sequence of images is generated by repeating the above process with the next image in place of the previous image for present a user's current interest.

15 Claims, 10 Drawing Sheets



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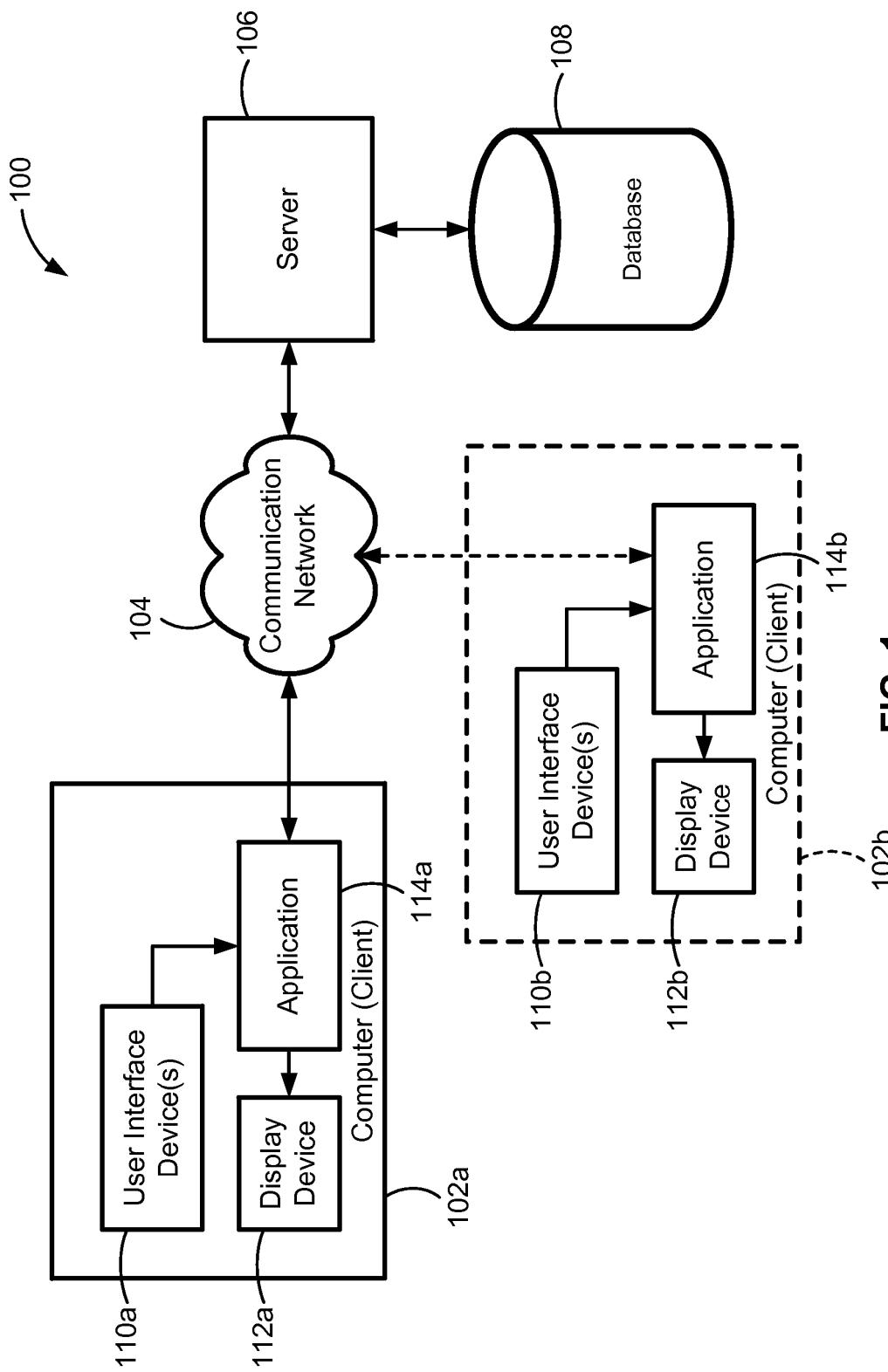
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**FIG. 1**
102b
102a
110a
112a
114a
104
100
108
106
110b
112b
114b

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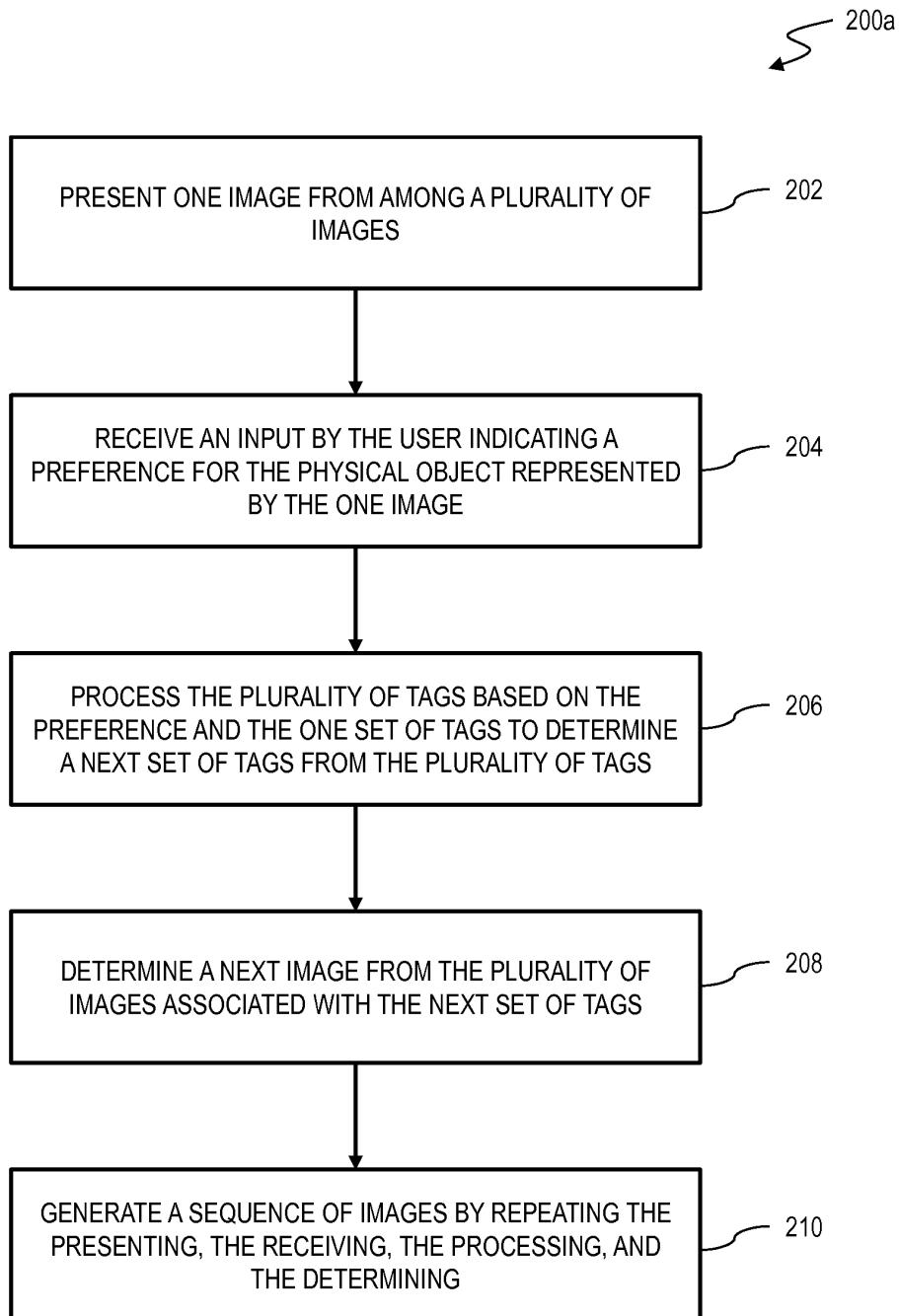


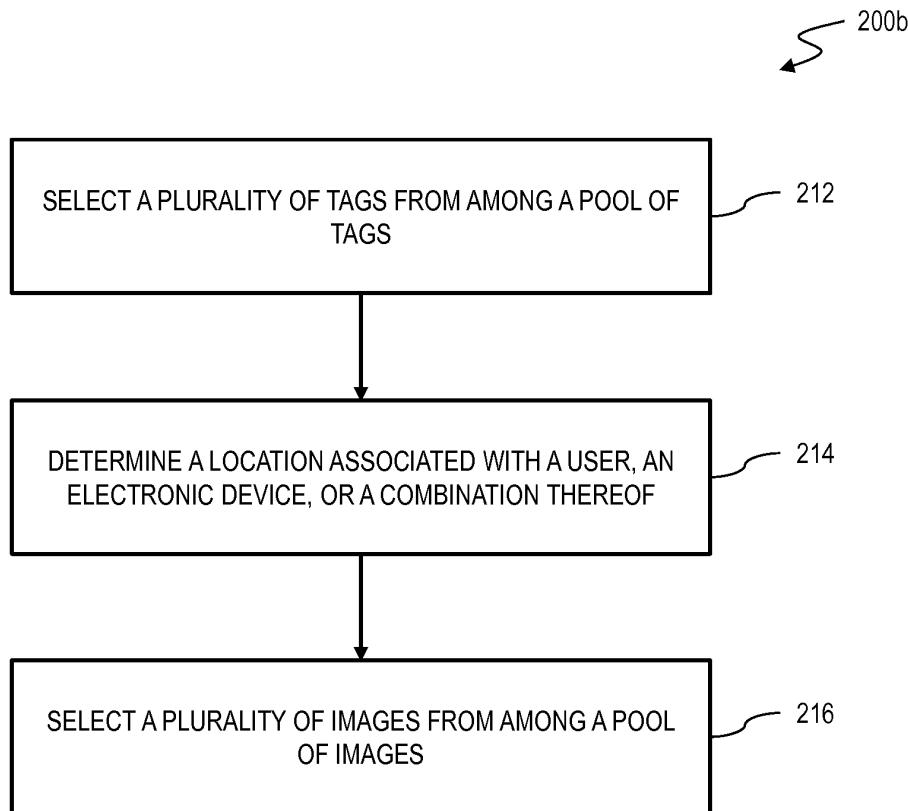
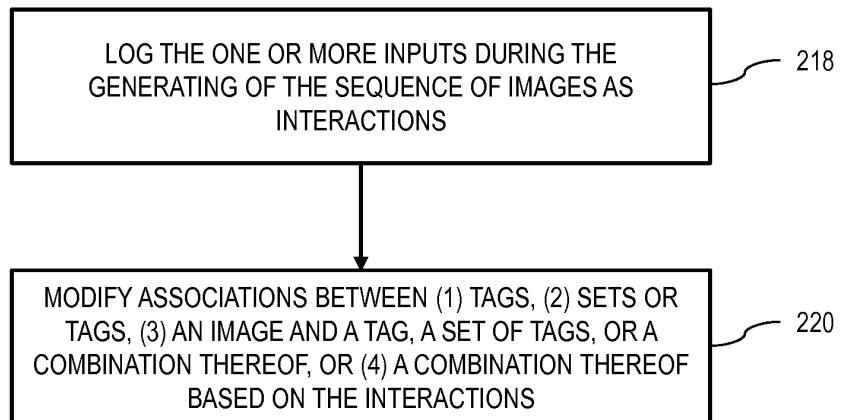
FIG. 2A

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**FIG. 2B****FIG. 2C**

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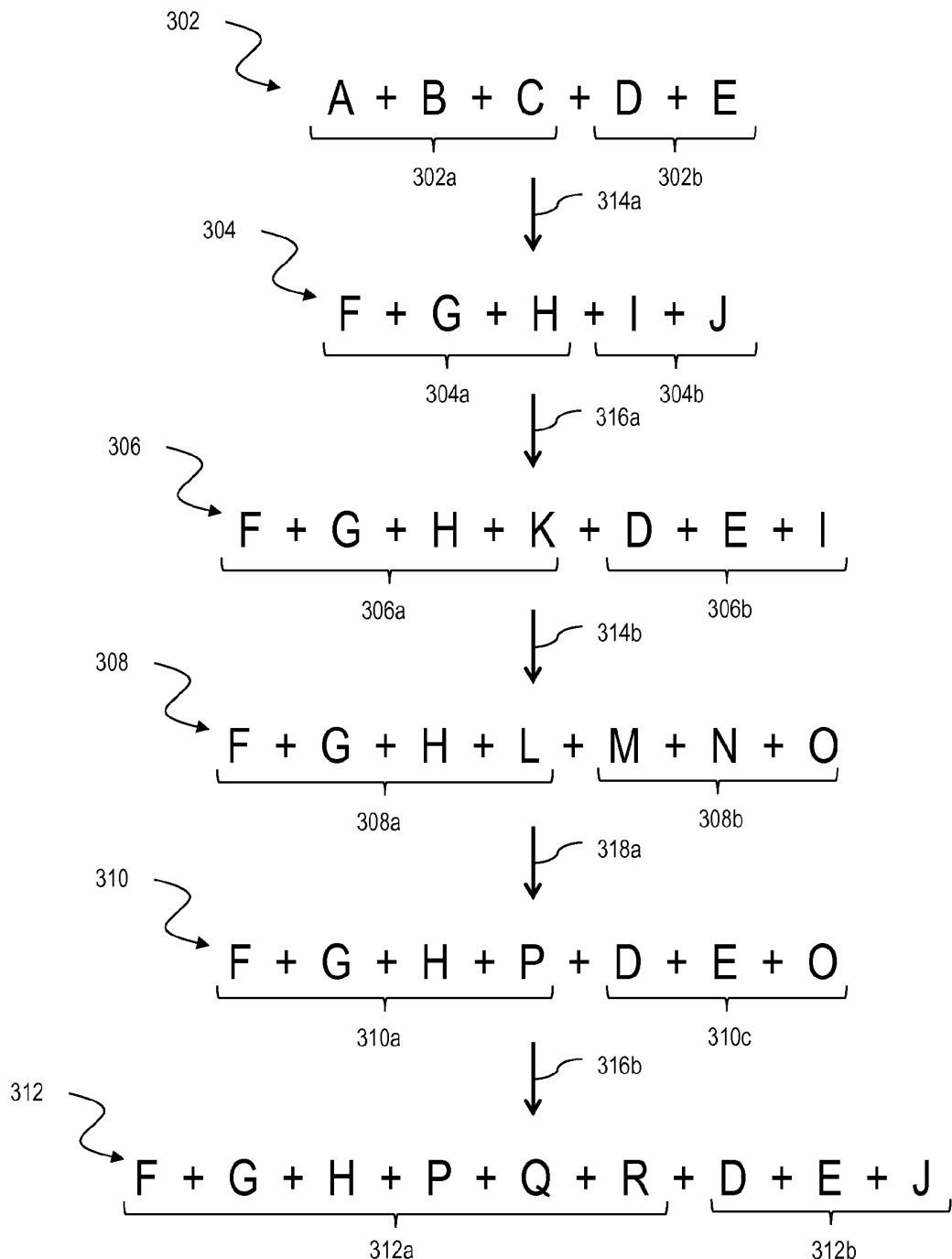


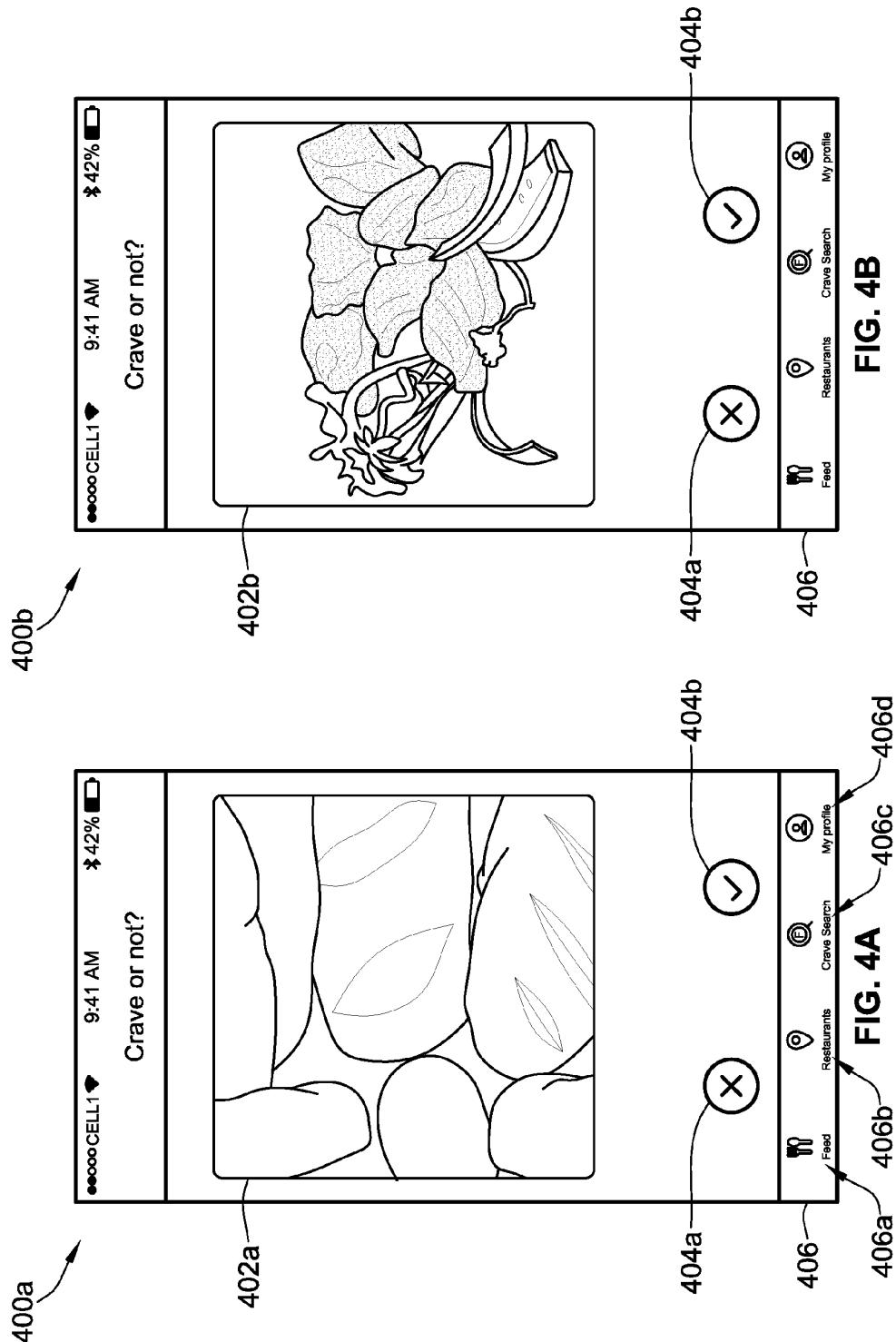
FIG. 3

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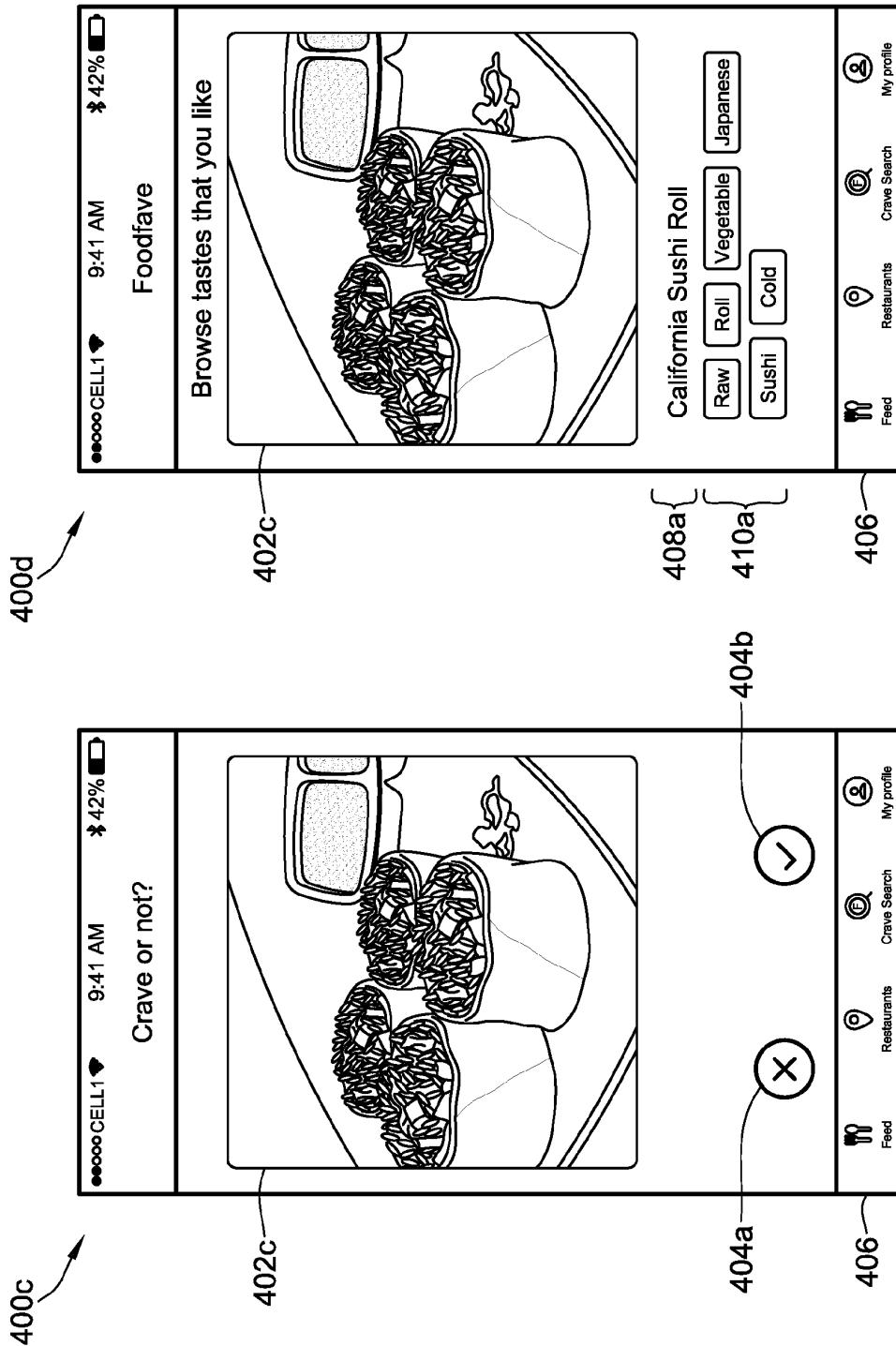


FIG. 4C

FIG. 4D

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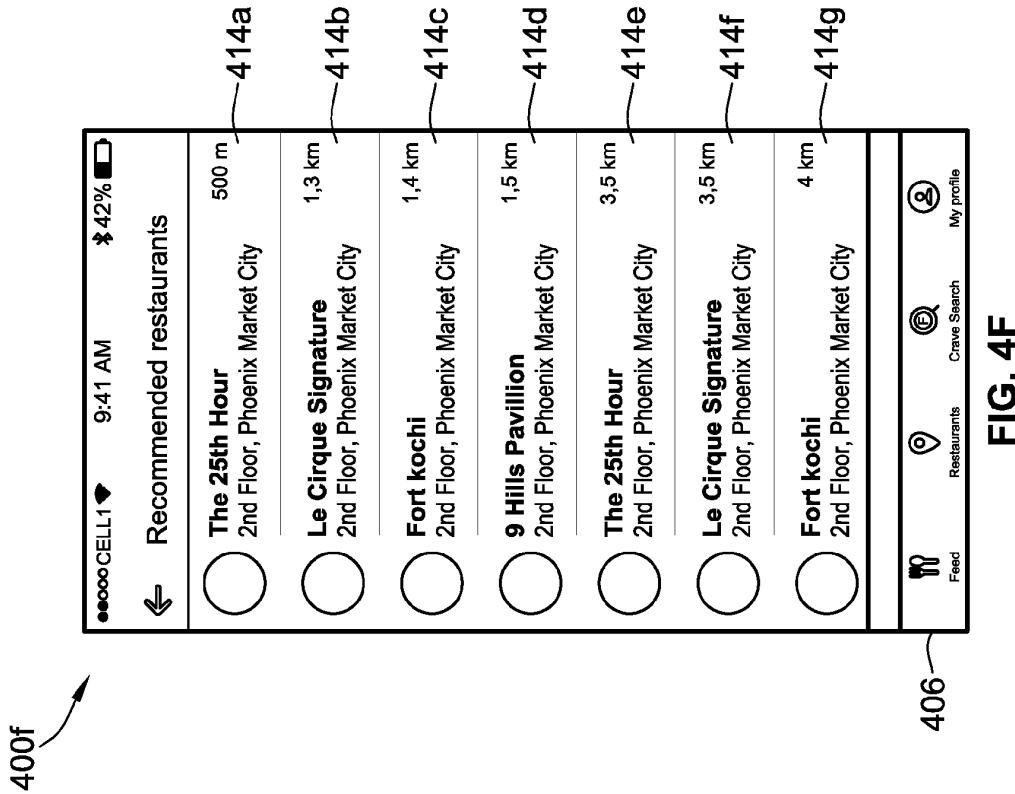


FIG. 4F

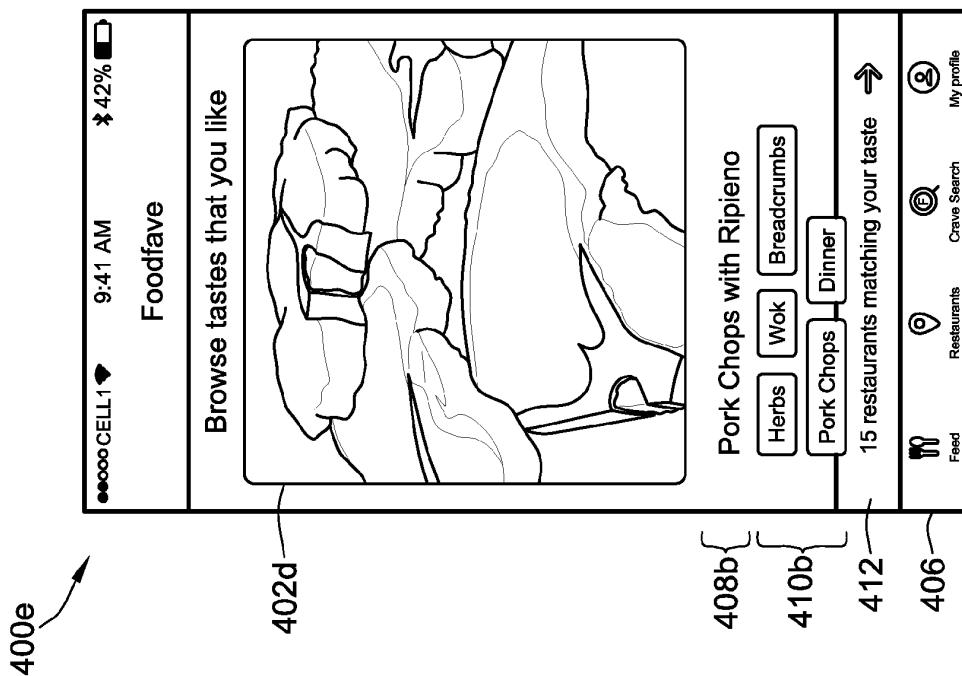


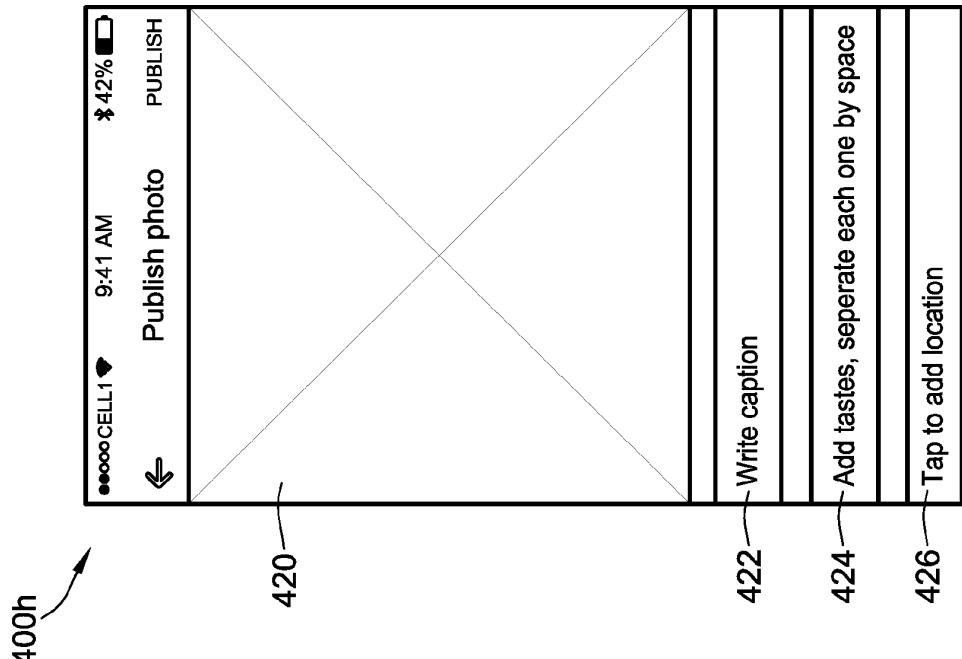
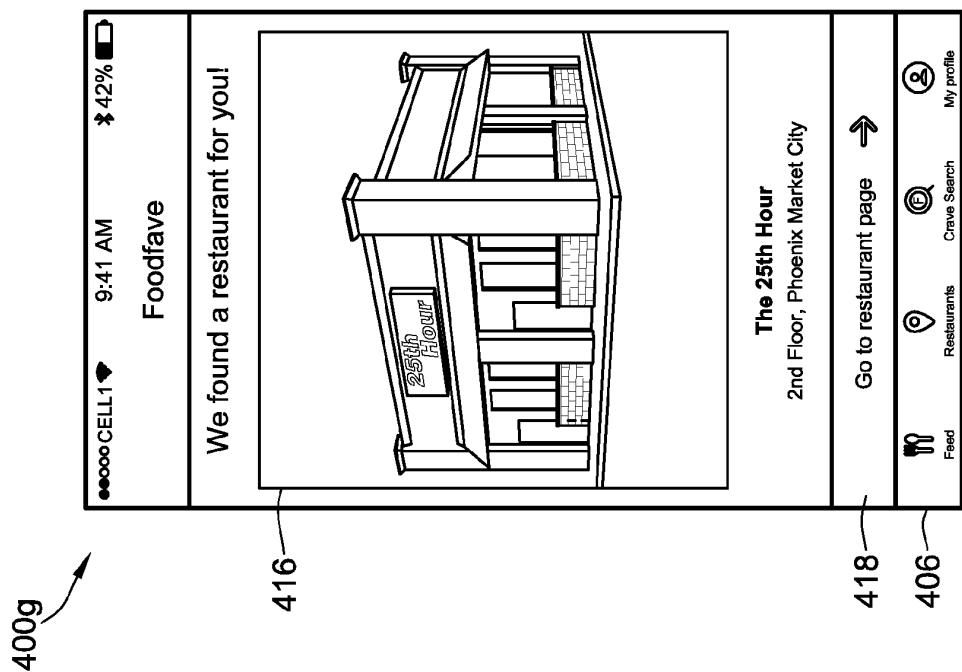
FIG. 4E

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**FIG. 4H****FIG. 4G**

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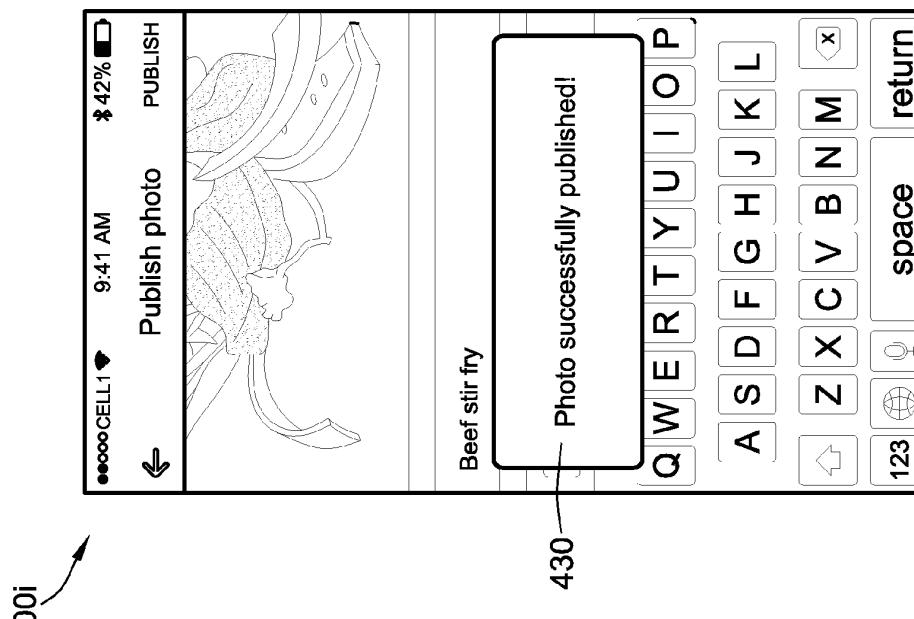


FIG. 4J

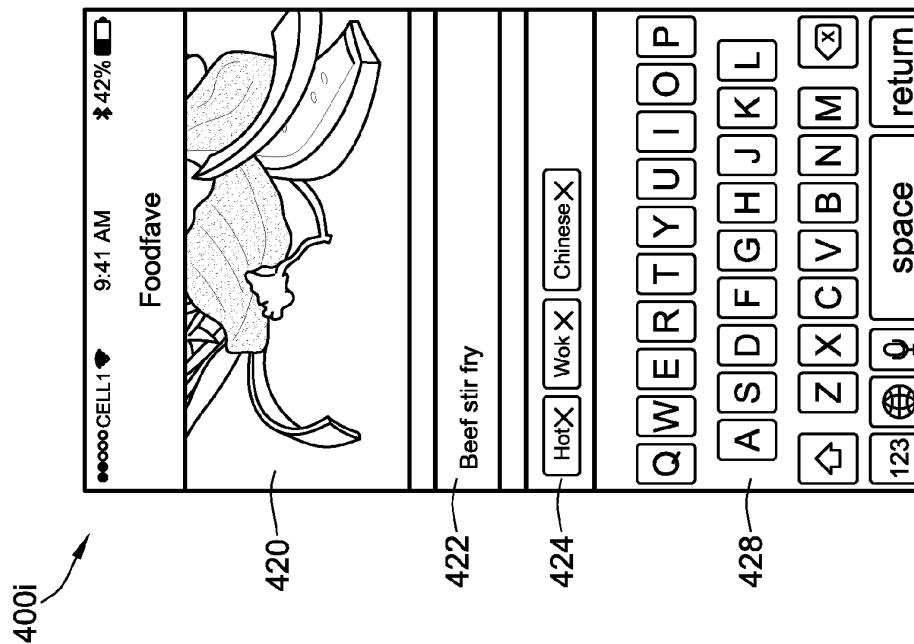


FIG. 4I

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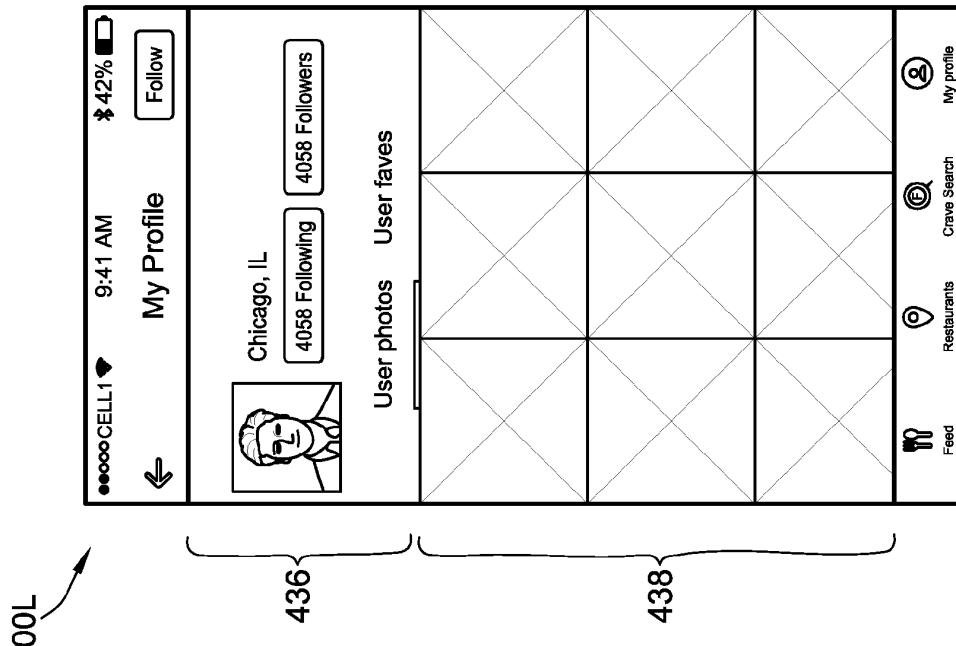


FIG. 4L

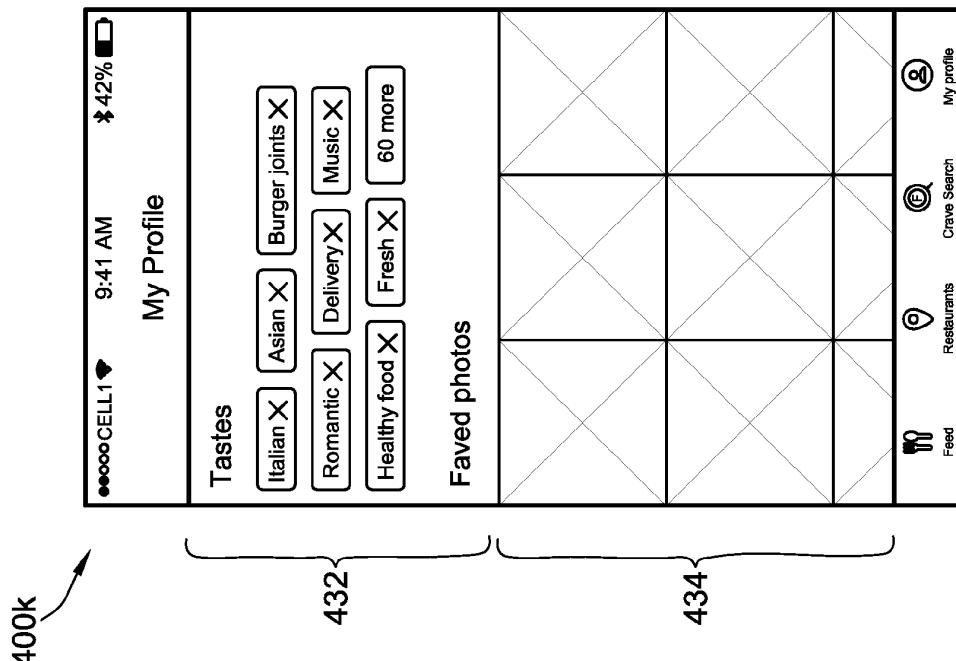


FIG. 4K

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**SYSTEM AND COMPUTER METHOD FOR
VISUALLY GUIDING A USER TO A
CURRENT INTEREST**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

This application claims priority to and the benefit of U.S. Provisional Application No. 62/037,788, filed Aug. 15, 2014, which is hereby incorporated by reference herein in its entirety.

FIELD OF THE PRESENT DISCLOSURE

Aspects of the present disclosure relate generally to systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest.

BACKGROUND

There exist a multitude of applications, both Internet-based applications and smartphone/tablet-based applications, that make recommendations for users based on analyzing a user's history. A user's history can include or reflect, for example, choices the user previously made based on the user's preferences. Although a user's preferences can be constant as a whole over a long period of time, the generality of the preferences allow for a user's current specific preference to be less defined. For example, user's preferences with respect to food are fairly constant. A user may prefer, for example, Italian food and Chinese food. A history of the user's food preferences captures this general information and may allow applications to provide a generalized recommendation for what a user may want now or in the future. However, a user's current preferences can be more granular than what can be captured by recommendation systems that rely on analyzing a user's history to make a current recommendation at a specific moment in time when the user may be craving something in particular. Thus, the granularity of a user's current, specific preference also allows for specific current interests than cannot accurately be predicted based on a user's history alone. For example, with respect to food, a user can experience cravings—where a user desires a specific type of food among all of the types of food that the user normally enjoys. Therefore, current applications do not help a user determine what the user's current interest is despite the applications' having access to the user's history. Moreover, although the user may know that he or she wants something, the particular object of the user's interest may be unknown even to the user until one of the user's senses is inspired or provoked. Further, thinking by the user of what the users' current interest is, alone, may not help the user in defining his or her current interest.

According to aspects of the present disclosure, a system and computer-implemented method are disclosed that guide a user to his or her current interest based on a sequential presentation of images representative of possible physical objects of interest.

SUMMARY

An aspect of the present disclosure includes a computer-implemented method of analyzing tags associated with a sequence of images presented to a user in response to human-machine inputs made by the user to present a current interest of the user, such as a food craving. The method includes presenting, via a display of an electronic device, one image

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from among a plurality of images. The one image represents a physical object and is associated with one set of tags from a plurality of tags. Each tag of the one set of tags describes or characterizes attributes of the physical object represented by the one image. The method further includes receiving, via a user interface of the electronic device, an input by the user indicating a preference for the physical object represented by the one image. The method also includes processing, by one or more computer devices, the plurality of tags based on the preference and the one set of tags to determine a next set of tags from the plurality of tags. The method further includes determining, by the one or more computer devices, a next image from the plurality of images associated with the next set of tags. The next image represents a physical object that is different from the physical object represented by the one image, and the next set of tags describes or characterizes attributes of the physical object represented by the next image. The method also includes generating the sequence of images by repeating the presenting, the receiving, the processing, and the determining with the next image in place of the one image during a session of presenting the current interest of the user.

An additional aspect of the present disclosure includes one or more computer-readable, non-transitory, storage media encoding machine-readable instructions that, when executed by one or more computers, cause operations to be carried out. The operations include presenting, via a display of an electronic device, one image from among a plurality of images. The one image represents a physical object and is associated with one set of tags from a plurality of tags. Each tag of the one set of tags describes or characterizes attributes of the physical object represented by the one image. The operations include further include receiving, via a user interface of the electronic device, an input by the user indicating a preference for the physical object represented by the one image. The operations also include processing, by one or more computer devices, the plurality of tags based on the preference and the one set of tags to determine a next set of tags from the plurality of tags. The operations further include determining, by the one or more computer devices, a next image from the plurality of images associated with the next set of tags. The next image represents a physical object that is different from the physical object represented by the one image, and the next set of tags describes or characterizes attributes of the physical object represented by the next image. The operations also include generating the sequence of images by repeating the presenting, the receiving, the processing, and the determining with the next image in place of the one image during a session of presenting the current interest of the user.

Further aspects of the present disclosure include a computer-implemented method of automatically recommending restaurants proximate a user based on a sequence of the user's expressed food preferences. The method includes receiving a geographic location associated with the user, and retrieving, using one or more computer devices, a first set of digital photographs, each depicting a different food, and associated with a plurality of tags indicating a genre of the food featured in the corresponding photograph, a description of the food featured in the corresponding photograph, and a food establishment where the corresponding photograph of the food was taken. The food establishment is located within a predetermined proximity of the geographic location. The method further includes displaying, by a display device, the first set of photographs over one or multiple frames on the display device. For each of at least some of the first set of photographs, the method includes receiving via a user input device

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one of at least two input options, the at least two input options including a favorable indication of a preference for the food featured in the corresponding one of the at least some of the first set of photographs or an unfavorable indication of a disinclination for the food featured in the corresponding one of the at least some of the first set of photographs. The method also includes storing, for each of the at least some of the first set of photographs, in a memory storage device, a record indicating a relationship between the received input option and the tags associated with each corresponding one of the at least some of the first set of photographs, to produce a plurality of records on the memory storage device. The method further includes analyzing, using the computer or another computer, the records to identify a genre of food having at least a probable chance of being liked by the user, and retrieving, using the computer or another computer, a further digital photograph depicting a food, the further digital photograph being associated with a tag indicating a genre of the food featured in the further photograph and having at least a probable correlation with or matching the identified genre. The method also includes using the received geographic location, the computer or another computer identifying at least one food establishment, which is located in a predetermined proximity to the received geographic location and which serves the identified genre of food, and displaying, by the display device, information regarding the at least one identified food establishment.

Additional aspects of the present disclosure will be apparent to those of ordinary skill in the art in view of the detailed description of various embodiments, which is made with reference to the drawings, a brief description of which is provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a functional block diagram of a computer system according to an aspect of the present disclosure.

FIG. 2A is a flowchart of a computer-implemented method or algorithm of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 2B is a flowchart of a computer-implemented method or algorithm of determining from among a pool of tags and a pool images tags and images that are relevant for a user according to aspects of the present disclosure.

FIG. 2C is a flowchart of a computer-implemented method or algorithm of determining and/or updating associations between elements within the system according to aspects of the present disclosure.

FIG. 3 is a diagram of a flow illustrating the processing of a plurality of tags that are relevant to a user according to aspects of the present disclosure.

FIG. 4A illustrates a user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4B illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4C illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

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FIG. 4D illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4E illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4F illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4G illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4H illustrates a user interface for uploading an image according to aspects of the present disclosure.

FIG. 4I illustrates another user interface for uploading an image according to aspects of the present disclosure.

FIG. 4J illustrates another user interface for uploading an image according to aspects of the present disclosure.

FIG. 4K illustrates a user interface for visualizing a profile of a user according to aspects of the present disclosure.

FIG. 4L illustrates a user interface for visualizing a profile of a user according to aspects of the present disclosure.

DETAILED DESCRIPTION

While this disclosure is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail example implementations of the inventions and concepts herein with the understanding that the present disclosure is to be considered as an exemplification of the principles of the inventions and concepts and is not intended to limit the broad aspect of the disclosed implementations to the examples illustrated. For purposes of the present detailed description, the singular includes the plural and vice versa (unless specifically disclaimed); the words "and" and "or" shall be both conjunctive and disjunctive; the word "all" means "any and all"; the word "any" means "any and all"; and the word "including" means "including without limitation."

A (software) module can refer to computer-readable object code that executes a software sub-routine or program, which corresponds to instructions executed by any microprocessor or microprocessing device to perform described functions, acts, or steps. Any of the methods or algorithms or functions described herein can include non-transitory machine or computer-readable instructions for execution by: (a) an electronic processor, (b) an electronic controller, and/or (c) any other suitable electronic processing device. Any algorithm, software module, software component, software program, routine, sub-routine, or software application, or method disclosed herein can be embodied as a computer program product having one or more non-transitory tangible medium or media, such as, for example, a flash memory, a CD-ROM, a floppy disk, a hard drive, a digital versatile disk (DVD), or other electronic memory devices, but persons of ordinary skill in the art will readily appreciate that the entire algorithm and/or parts thereof could alternatively be executed by a device other than an electronic controller and/or embodied in firmware or dedicated hardware in a well-known manner (e.g., it may be implemented by an application specific integrated circuit).

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grated circuit (ASIC), a programmable logic device (PLD), a field programmable logic device (FPLD), discrete logic, etc.).

As discussed above, there currently exist recommendation systems that are unable to account for a user's current (i.e., contemporaneous) interest or preference based on the breadth of the user's interest, despite, for example, the recommendation systems having access to information regarding the user's history. The granularity of a user's current preference relative to, for example, a user's historical preferences with respect to the subject matter relating to the preference prohibits current recommendation systems from being able to estimate or present the user's current interest at the moment in time the user may be craving something. At best, current recommendation systems merely provide a one-time guess regarding the user's current preference. Moreover, within the realm of food, in particular, current applications exist that provide information regarding broad categories of food that are available within the user's current location. However, the amount of information provided by such applications may amount to information overload. The information overload does not allow a user to determine a specific food dish in which the user is currently interested. What is needed, *inter alia*, is a guided, iterative searching solution that repeatedly and dynamically adjusts searching criteria in response to human-machine inputs made by the user to arrive at a recommendation that will satisfy the user's contemporaneous craving at the conclusion of the search session. In this way, both human and machine are necessary partners in this search strategy. Only the human can, using his or her subjective senses, ascertain from an image how a user feels about what is presented in the image. However, to satisfy an immediate craving, the machine is needed to help the human user arrive at a recommendation quickly, within less than a minute or so. The Internet, cellular data and wireless technology, and smartphones have given users instant access and visibility to a myriad of options, but in some respects, this access and visibility is as much a blessing as it is a curse. With so many choices and options readily available, a new programmed machine is needed to help users find relevant information quickly to satisfy needs that are fleeting and must be satisfied quickly.

Accordingly, aspects of the present disclosure provide for systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The systems and methods allow for the presentation of a sequence of images to the user. Each image represents a physical object that the user can obtain through a physical entity that provides the physical object. In the realm of food, for example, the physical object can represent a food dish and the physical entity can represent a restaurant or store or food establishment (e.g., market, grocery, store, etc.) that offers the food dish. A food dish as used herein includes any edible item or combination of edible items that can be consumed (e.g., eaten or drunk) by animals, including drinks such as bubble tea, milkshakes, or cocktails. Each image within the sequence is associated with a set of tags that describe the physical object. Based on a user's preference for each tag, a new image is presented to generate the sequence of images. The new image is selected based on the set of tags associated with the image that describe the physical object represented by the image, and how the set of tags for the new image relate to the set of tags for the previous image based on the preference of the previous image. The sequence of presenting images to the user that represent physical objects continues to guide the user into determining a physical object that satisfies or describes the user's current interest. Once the user is presented with an image that represents a physical

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(tangible) object that the user is currently interested in (e.g., craving), the systems and methods allow for the user to select the image (e.g., a digital photograph) to be presented information on how to obtain (e.g., consume) items depicted in the physical image. In the realm of food as a human interest, for example, the user can be directed to an Internet web site of a physical entity such as a restaurant or other food establishment that serves or offers food at which the user can purchase the dish of food and optionally consume at the food establishment. According to some embodiments, the user can be directed to an electronic user interface of a software application, independent from the web site of the restaurant, at which the user can purchase the dish of food, to provide additional convenience to the process of obtaining the food dish.

15 FIG. 1 is a functional block diagram of a system 100 according to an aspect of the present disclosure. First, the general components of the system 100 will be introduced, followed by examples. The system 100 includes one or more electronic computers (clients) 102a, 102b. Reference numbers used herein without a letter can refer to a specific one of the plurality of items, a subset of multiple items of the plurality of items, or all items of the plurality of items so numbered with the same reference number. Thus, by way of example, the reference number 102 can refer to the computer 102a, the computer 102b, or both of the computers 102a and 102b, as shown in FIG. 1. The one or more computers 102a, 102b connect to a communication network 104, such as the Internet. However, the communication network 104 can be any type of electronic communication network. A computer as used herein includes any one or more electronic devices having a central processing unit (CPU) or controller or microprocessor or microcontroller as understood by those skilled in the art of electronic computers. Examples of computers include tablet computers, laptop computers, desktop computers, servers, smartphones, a wearable electronic device such as a watch, an eyeglass, an article of clothing, or a wristband, and personal digital assistants (PDAs). The term computer as used herein can include a system of electronic devices coupled together to form what is conventionally referred to as a computer. For example, one or more input devices, such as a keyboard or a mouse, and one or more electronic display devices, such as a video display, can be coupled to a housing that houses the CPU or controller. Or, all components of the computer can be integrated into a single housing, such as in the case of a tablet computer or a smartphone. The one or more computers 102a, 102b conventionally include or are operatively coupled to one or more memory devices that store digital information therein, including non-transitory machine-readable instructions and data.

50 The one or more computers 102a, 102b include user interface devices 110a, 110b. Each user interface device 110a, 110b corresponds to a human-machine interface (HMI) that accepts inputs made by a human (e.g., via touch, click, gesture, voice, etc.) and converts those inputs into corresponding electronic signals. Non-limiting examples of user interface devices 110a, 110b include a touchscreen, a keyboard, a mouse, a camera, and a microphone. These are also referred to as human-machine interface devices, because they allow a human to interact with a machine by providing inputs supplied by the human user to the machine.

The one or more computers 102a, 102b also include electronic display devices 112a, 112b that are configured to display information that can be visually perceived. Non-limiting examples of display devices 112a, 112b include an electronic video display, a stereoscopic display, or any electronic display configured to visually portray information including text, static graphics, and moving animations that is perceiv-

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able by the human eye. The electronic display devices **112a**, **112b** display visual information contained in an electronic user interface (UI). The electronic UI can also include selectable elements that are selectable using the one or more HMI devices **110a**, **110b**. Thus, the electronic UI generally can include a graphical user interface (GUI) component and a human-machine user interface component, via which a human user can select selectable elements displayed on the GUI via the HMI interface.

The one or more computers **102a**, **102b** also include software applications **114a**, **114b**. That is, the one or more computers **102a**, **102b** execute non-transitory machine-readable instructions and data that implement the software applications **114a**, **114b**. The applications **114a**, **114b** perform one or more functions on the one or more computers **102a**, **102b**. The applications **114a**, **114b** can be various specific types of applications, such as a web browser application or a native application. Within the system **100**, the applications **114a**, **114b** convey information between the one or more computers **102a**, **102b** and the communication network **104** (e.g., Internet) via a conventional wired or wireless electronic communications interface associated with the one or more computers **102a**, **102b**. Alternatively, or in addition, the applications **114a**, **114b** can be a native application. Native applications convey information between the one or more computers **102a**, **102b** over the communication network **104** to an application server **106**. The native applications **114a**, **114b** conventionally convey information between the one or more computers **102a**, **102b** over the communication network **104** via a conventional wired or wireless electronic communications interface associated with the one or more computers **102a**, **102b**.

As described above, the server **106** is also coupled to the communication network **104**. The server **106** is a type of computer, and has a well understood meaning in the art. The server **106** can be, for example, a web browser server, such as in the case of applications **114a**, **114b** being web browser applications. Or, the server **106** can be, for example, a native application server, such as in the case of applications **114a**, **114b** being native applications.

An electronic database **108** is incorporated in or is coupled to the server **106**. The database **108** is a form of a memory device or a data store, and stores electronic data for retrieval and archival relative to the server **106**. Both the server **106** and the one or more applications **114a**, **114b** communicate information according to one or more protocols, such as the hypertext transfer protocol (HTTP) in the case of the communication network **104** being the Internet. In the case of the communication network **104** being a private local area network (LAN), instead of the Internet, any other communications protocol can be used instead of the HTTP. For example, native applications can instead communicate using a proprietary or conventional communications protocol to pass information between the one or more computers **102a**, **102b** and the server **106**.

Although the system **100** is shown generally with respect to FIG. 1 as including two computers **102a**, **102b**, one server **106**, and one database **108**, the system **100** can include any number of computers **102a**, **102b**, any number of independent or clustered servers **106** (e.g., server farm or sever cluster), and any number of databases **108**. Moreover, some or all functionality of one or more components of the system **100** can be transferred, in whole or in part, to other components of the system **100**. By way of example, functionality of the server **106** and/or the database **108** can be transferred, in

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whole or in part, to the one or more computers **102a**, **102b**, depending on the functionality and performance of the computers **102a**, **102b**.

The applications **114a**, **114b** communicate with the server **106** and the database **108** over the communication network **104** for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The applications **114a**, **114b** control the user interface devices **110a**, **110b** and the display devices **112a**, **112b** to present the images to the user and to receive inputs from the user indicating the user's preferences for the images. The images are communicated over the communication network **104** to the applications **114a**, **114b** of the one or more computers **102a**, **102b** from the database **108**, either directly or through the server **106**. Accordingly, based on a client-server arrangement of the system **100**, with the computers **102a**, **102b** as the clients and the server **106** as the server, the database **108** stores the information used for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The server **106** performs the functionality of the algorithms described herein, including serving the information from the database **108** to the clients (e.g., computers **102a**, **102b**). The computers **102a**, **102b** present the information to the user and receive the inputs from the users, which are then presented to the server **106** for processing. However, the functionality disclosed herein with respect to the disclosed algorithms can be divided among the components of the system **100** differently than as explicitly disclosed, without departing from the present disclosure. For example, all of the functionality disclosed herein can be embodied in one or more of the computers **102a**, **102b**, such as the computers **102a**, **102b** being arranged as a distributed network, depending on the capability of the computers **102a**, **102b**.

As one facet of the information, the database **108** electronically stores the electronic images within a data store of images. The images can be of various file formats and image types. By way of example, the file formats can include JPEG, Tagged Image File Format (TIFF), Portable Network Graphics (PNG), etc. The image types can include digital photographs, digital drawings, icons, etc. As discussed above, the images stored on the database **108** represent a physical object that may be of interest to the user (e.g., the user may be craving). Accordingly, the images visually convey information to the user so that the user understands the physical objects that the images represent. The system **100** can initially include a set number of images. The set number of the images can be defined by the administrator of the system **100**. As described below, the system **100** also allows for users to add additional images to the system **100**. For example, users can upload images from the one or more computers **102a**, **102b** to add additional images to the database **108**. As the users interact with the system **100**, and the users upload images to the system **100**, the number of images increases. For example, the images can be digital photographs of food (including drinks) the users who upload them have ordered or seen at restaurants they have visited.

For each image, the database **108** stores information regarding the physical object that the image represents. The physical object can be any physical (tangible) object that is representable by an image. By way of example, and without limitation, the physical objects can be food dishes, consumer goods, such as clothing, automobiles, etc., physical locations, such as vacation spots, museums, sports venues, etc. For purposes of convenience, the present disclosure is related primarily to food dishes as the physical objects. However, as understood by one of ordinary skill in the art, the disclosure is not limited to physical objects that are only food dishes.

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Rather, each physical object can be any physical object represented by an image such that a user can identify the physical object when presented the image.

The database **108** also stores electronic tags. Primary tags are used within the system **100** to describe and/or characterize the physical object that is represented by an image. The primary tags can include single words or several words linked together as a tag that describe or characterize the physical object overall, or that describe or characterize sub-components or sub-aspects (e.g., attributes) of the physical object. Accordingly, for each image, the image is associated with a set of tags that describe or characterize the physical object. The database **108** stores all of the tags within a pool of tags, which is the totality of tags that can be associated with an image to describe a characteristic and/or a quality of the physical object that is represented by the image. The primary tags can be any type of descriptor of the physical object represented by the image. With respect to the physical objects being food dishes, the tags can describe general aspects of the food dishes, such as, for example, an ethnicity or a cuisine of the food dish, such as African, American, Argentinian, etc., which meal of the day the food dish generally applies to, such as breakfast, brunch, lunch, dinner, supper, snack, dessert, late-night, etc. The tags can also be adjectives that describe the food dishes, such as, for example, cheesy, crunchy, hot, cold, spicy, etc. The tags can also identify the food or ingredients generally that constitute the food dish, such as, for example, vegetables, meats, fruits, breads, etc. The tags can also identify the food or ingredients more specifically that constitute the food dish, such as, for example, identifying the specific fruit, such as apples, apricots, etc., the specific meat, such as beef, poultry, fish, pork, etc., the specific vegetable, such as broccoli, asparagus, lettuce, carrots, etc. The tags can also identify the specific food dish as a whole, such as, for example, spaghetti with vodka sauce, fettuccine stroganoff, leg of lamb, etc., or constituent sub-dishes (e.g., "sides") within the food dish, such as, for example, sausage, eggs, pancakes, French toast, etc., that are all within the food dish of a large breakfast with various constituents.

The tags can be objective, subjective (or semi-subjective), or tangential regarding how the tags describe or characterize the physical object that is associated with the image. The examples of primary tags provided above are objective tags that directly describe the physical objects. The tags may additionally include tags that are at least partially subjective and/or tangentially describe the physical objects. With respect to food dishes as the physical objects for purposes of example, subjective or semi-subjective tags may include, for example, tasty, mouth-watering, delicious, healthy, hearty, etc. Such subjective or semi-subjective tags may apply to the food dish for one user but not necessarily all users. Tangential tags may describe aspects of the physical object only when correlated with other information. Such other information may only be known or apply to a subset of users that interact with the system **100**. By way of example, such tags may be terms currently trending in social media, such as hashtags on TWITTER® that apply to only a subgroup of users that are following the current social media trends. Such tags include, for example, hipster, yolo, GenY, GenX, etc. Independent of the context of the tag, these tangential tags do not necessarily apply to a physical object. However, patterns may develop that allow certain tangential tags to be understood as referring to a quality or characteristic of a physical object.

Like the images, the system **100** initially begins with a certain number of tags. However, the group of tags can be dynamic and evolve as the users interact with the system **100**.

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For example, additional tags can be added to the pool of tags as users upload new images of physical objects to the system **100** and describe the physical objects based on new tags that the users create. The users can create additional tags to describe or characterize the physical object that is associated with the image that the users uploaded. Each image is associated with one or more of the tags from among the group of tags as a set of tags for the image. The association can be based on an administrator of the system **100** associating the tags with the images. Alternatively, or in addition, the association can be based on users of the system **100** associating the tags with the images and/or creating new tags. The association based on the users can be manual, such as the users manually selecting a tag to associate with an image. Alternatively, or in addition, the association can be automatic, such as the system **100** automatically determining tags that apply to images. Based on the images being associated with multiple tags as a set of tags, the database **108** also stores information pertaining to specific sets of tags. A specific combination of tags is a set of tags. A single set of tags can describe multiple different images based on the generality of each tag and an image being associated with any number of tags. The database **108** may include a data structure, such as a table, to track the various sets of tags based on the various associations between tags and images within the database **108**.

The database **108** also stores and tracks associations between elements of the system **100**, such as between tags, between sets of tags, between images and tags and/or sets of tags, between users and the elements, etc. The system **100** can associate a tag with an image based on the image already being associated with another tag, and both of the tags including an association. By way of example with respect to food dishes as physical objects, an image may represent a Chinese food dish that includes rice. The image may already be associated with the tag Chinese but not be associated with the tag rice. Based on an association developed by the system **100** tracking usage of the tag "Chinese" with the tag "rice," in addition to, for example, other users liking other images that are tagged with both the tag "Chinese" and the tag "rice," the system **100** can automatically determine to associate the tag rice with the image based on the image being associated with the tag Chinese. The association can develop as the number of images that represent different physical objects increases within the database **108**, or as more users interact with the tags and with the images. For example, as more users upload images to the system **100**, the users may associate both of the tags Chinese and rice to the newly uploaded images. The system **100** tracks the continued association of the tag Chinese with the tag rice and logs the association within the database **108**.

The tags may be divided into two overall categories, such as primary tags and secondary tags. Primary tags are defined by an administrator of the system **100**. The primary tags include tags that directly describe or characterize the physical object. The system **100** at least initially includes primary tags. The system **100** can also initially include secondary tags. The secondary tags are defined by the administrator of the system **100** and/or by users of the system **100**. The secondary tags may identify the same characteristic and/or quality as the primary tags, or the secondary tags may identify different characteristics and/or qualities as the primary tags. Secondary tags may directly describe or characterize the physical object, such as with primary tags. In addition, secondary tags may subjectively describe or characterize the physical objects, or may tangentially describe or characterize the physical objects as described above.

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Each image is associated with at least one primary tag, but can be associated with any number of primary tags and secondary tags. Some images may be associated with only one primary tag. For example, an image may represent the physical object bread and the only tag associated with the image may be the tag bread. Some images may be associated with many different tags, such as an image that represents the physical object of French toast, which can include the tags bread, breakfast, egg, sweet, etc.

The systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest relies on a plurality of tags that is associated with a user being processed based on a previous set of tags of an image and a preference for that image from the user. Accordingly, the database 108 may store, or the server 106 may dynamically generate, a plurality of tags that are a subset of all of the tags (e.g., pool of tags) that are stored on the database 108. The plurality of tags includes not only the tags but also the sets of tags that correspond to the images that are covered by one or more of the tags. As will be described in greater detail below, the plurality of tags may be tags that apply or are relevant to a user, such as tags within the pool of tags that match tags associated with a user's profile. As the user is presented with images and provides preferences in response to the images, the plurality of tags evolves as certain tags are removed (or not considered) and/or certain sets of tags are removed (or not considered) from the plurality of tags.

The database 108 also stores user profiles. Generally, the user profiles include information that is used for the interacting with the system 100. Such information can include certain tags indicated by the user to include with the user's profile, images, physical objects, and/or entities for which the user has indicated a positive or a negative preference, independent of or dependent of the user interacting with images presented to the user during a session of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. With respect to food dishes for the physical objects, the information can include tags and images that apply to food dishes that the user prefers (e.g., likes), and food dishes that the user does not prefer (e.g., dislikes). The user can indicate such preferences through a manual selection of the tags. Alternatively, or in addition, such preferences can be learned by the system 100 during the user's interaction with the system 100 over a period of time, such as through an implicit selection of the tags as preferred tags through the user indicating over time a preference for the tags. The preference can be indicated according to a YES/NO schema, such as the user does or does not like a tag, an image, and/or a physical object. Alternatively, the preference can be indicated according to a weighted schema, such as a degree to which the user does or does not like a tag, image, and/or physical object. The profile information can include any other additional information associated with a user, such as the user's name, address, gender, age, ethnicity, religion, etc. The system 100 tracks such additional information to mine trends across the users for tags, images, and/or physical objects. For example, the system 100 tracks user's interactions within the system 100 to develop a user history. The user history tracks interactions between the user and the system 100 and allows the user to review the previous interactions. By way of example, the user history can include information pertaining to the user's preference to specific images that were previously presented to the user.

According to some embodiments, and with respect to food dishes as the physical objects specifically, the user profiles can include dietary restrictions, such as, for example, gluten-

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free, vegan, vegetarian, religious observations (e.g., no pork or shellfish, or Kosher/Halal only), nut allergies, etc. The database 108 can include dietary information to automatically translate the entered dietary restrictions into negative preferences for certain tags, images, and/or physical objects to which the dietary restrictions apply so that restricted food dishes are not presented to the user. The dietary information can be linked to the user's profile so that the user can view the dietary information used by the system 100.

As discussed above, the physical objects represent objects that are offered by various entities. The database 108 includes information with respect to the location of the entity associated with the physical object and/or the image that represents the physical object. By way of example, the physical object can represent a food dish and the physical entity represents the restaurant or store (e.g., market, grocery store, etc.) that offers the food dish. The database 108 includes information with respect to the location of the restaurant or store. In addition to the location, the database 108 can also include entity profiles. According to some embodiments, the entity profiles can be organized according to a subscription-based system. Entities that are subscribed to the system 100 can include specific information within their profiles that entities who are not subscribed cannot. With respect to food dishes, such information can include food dishes offered by the entity, such as images of food dishes that the entities created and uploaded into the system 100, in addition to the menu, any current specials/promotions/discounts offered, etc. According to some embodiments, user interactions with the system 100 will allow for the users to confirm the information presented in the entity profiles. The entity profiles can also include images to showcase the entity's physical objects, additional links leading to their websites or social media applications (e.g., FACEBOOK®, TWITTER®), etc.

The entity profiles allow users to browse the entities and click on a suggested or profiled entity, leading the user to the entity's profile. As part of the above-described associations, the system 100 collects and shares visitor frequency with entities when users are redirected to the entities' websites following selection of images associated with physical objects that are associated with the entities. According to some embodiments, the entity profiles will include a direct purchasing interface for users, thereby obviating the need for users to seek third party companies to order or consume physical objects associated with the entity.

FIG. 2A is a flowchart of a computer-implemented method or algorithm 200a of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest, using aspects of the present disclosure including the one or more computers 102a, 102b, the server 106, and the database 108. The computer-implemented method or algorithm 200a may be executed within a computer 102a, the server 106, the database 108, or across multiple platforms, such as on the computer 102a and the server 106. In regard of the latter arrangement, an application 114a executed by the computer 102a (e.g., client-side application) may perform the computer-implemented method or algorithm 200a in conjunction with an application executed on the server 106 (e.g., server-side application) according to a client-server relationship. The computer-implemented method or algorithm 200a begins with a user initiating a session of the computer-implemented method or algorithm 200a. As will be described in greater detail below, the session of the computer-implemented method or algorithm 200a begins with determining a plurality of tags that are associated with the user and that will be processed to determine subsequent images to present to the user to generate a sequence of images during a

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session of the computer-implemented method or algorithm **200a**. The plurality of tags also determines the plurality of images from which the images that are presented to the user are selected from. Thus, according to some embodiments, the computer-implemented method or algorithm **200a** processes only a subset of the tags and the images stored in the database **108** based on the user that initiated the session of the computer-implemented method or algorithm **200a**. The computer-implemented method or algorithm **200a** begins with one of the images from among the plurality of images being presented to the user, such as through the display device **112a** of the computer **102a** (202). As described above, the image represents a physical object and is associated with a set of tags. Each tag of the set of tag describes the physical object that is represented by the presented image. Thus, the user is presented with an image, and the user is able to recognize the physical object represented by the image.

As will be also described below, along with the image, one or more user interface elements or objects can be optionally presented on the display device **112a** of the computer **102a** to allow the user to indicate a preference or inclination/disinclination for the physical object that is represented by the image. The user interface elements may vary depending on the functionality/capability of the computer device **102a**, the user interface device **110a**, and/or the display device **112a**. Alternatively, the display device **112a** may not present graphical user interface elements (although it could) specifically for the user indicating the preference for the physical object. Rather or additionally, for example, it may be implicit what action the user should take to indicate the preference, such as by swiping left on or near the image or anywhere on the display device **112a** to indicate a negative preference (e.g., dislike) and swiping right on or near the image or anywhere on the display device **112a** to indicate a positive preference (e.g., like), or vice versa. To be clear, the present disclosure also contemplates displaying graphical UI elements (e.g., like and dislike virtual buttons displayed on the display device **112** for selection using a user interface device **110**), and recognizing gestures (e.g., swiping) made by a user relative to a user interface device **110**, or one or the other.

Upon the image being presented (e.g., displayed on the display device **112**) to the user, the computer-implemented method or algorithm **200a** receives an input from the user indicating a preference for the physical object represented by the image (204). The preference may be like or an inclination toward the object (e.g., positive) or dislike or disinclination against the object (e.g., negative). Alternatively, the preference may be like (e.g., positive), dislike (e.g., negative), or neither like nor dislike (e.g., neutral). A neutral preference may indicate that the user cannot tell whether he or she likes or dislikes the physical object represented by the image. Alternatively, the preference may be scaled, such as a range of 1 to 10 to indicate the degree that the user likes (e.g., 6 to 10) or dislikes (e.g., 1 to 5) the physical object represented by the image.

The computer-implemented method or algorithm **200a** then processes the plurality of tags based on the preference indicated by the user (206). Processing of tags refers to the manipulation or treatment of the tags drawn from the pool of tags by the computer **102** or server **106** during a session. The plurality of tags that is processed is the tags that are selected from the pool of tags stored within the database **108**. The processing includes determining a next set of tags based on the preference the user provided in response to the previous image, and the set of tags that are associated with the previous image. Based on the preference, the set of tags from the previous image determine how the plurality of tags is pro-

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cessed to determine the next set of tags. By way of example, if the preference that the user indicated to a previous image is positive, negative, or neutral, the plurality of tags are processed (e.g., treated) differently based on the set of tags of the previous image. In response to the preference for the physical object represented by the previous image being negative, the processing of the plurality of tags includes removing tags from the plurality of tags that correspond to the tags from the set of tags of the previous image. The tags are removed from the plurality of tags that are processed to determine the next set of tags at each iteration of the computer-implemented method or algorithm **200a**, for the remainder of the session, so that an image is not presented to the user for the remainder of the session that includes the particular tags. Although the tags are described throughout as being removed from the plurality of tags, removal includes removing the tags from the plurality of tags and also includes leaving the tags within the plurality of tags but not considering the tags. For example, the tags can remain within the plurality of tags but the tags can be marked as, for example, removed such that the tags are not considered during the processing of the plurality of tags.

As discussed above, the tags can be categorized generally as primary tags and secondary tags. An image can be associated with both primary tags and secondary tags. According to some embodiments, the tags that are associated with an image and that are removed from the plurality of tags in response to a negative preference are only the primary tags from the set of tags associated with the image that received a negative preference. Alternatively, both the primary tags and the secondary tags from the set of tags associated with an image that received a negative preference are removed from the plurality of tags in response to a negative preference. Alternatively, whether only primary tags or both primary tags and secondary tags are removed from the plurality of tags may be determined based on the number that have been presented to the user. For example, if the image is one of the first N images presented to the user, where N is 3, 4, or 5, only the primary tags associated with the image are removed from the plurality of tags in response to an input by the user indicating a negative preference. However, if the image is a later image presented to the user, such as the sixth, seventh, or eighth image, both the primary tags and the secondary tags that are associated with the image are removed from the plurality of tags. For subsequent images that are presented to a user after the user has indicated a positive preference to at least one previous image, only those tags that are associated with the newly presented image and that are new relative to the previously presented set of tags are the tags that are removed from the plurality of tags, whether they are only primary tags or both primary and secondary tags.

In addition to removing tags (e.g., negative tags) that are associated with an image that the user provides a negative preference for, the computer-implemented method or algorithm **200a** may also remove tags that are associated with the negative tags from the plurality of tags (e.g., associated tags). As discussed above, in addition to the tags being stored in the database **108**, the database also stores associations between tags. For example, certain tags may be associated with other tags based on trends in the physical objects represented by the images, such as the tag labeled "Chinese" being more associated with the tag labeled "rice" than the tag labeled "burger." Accordingly, in response to a negative preference, the computer-implemented method or algorithm **200a** may determine associated tags that satisfy a threshold association with the negative tags. The threshold for the association may be based on any number of factors or metrics, such as the number of times two tags are associated with the same image,

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the number of times a user indicates a certain preference (e.g., like or dislike) for an image, and the tags that are associated with the image, etc. For example, the association may be based on the number of times two tags are associated with an image when the image is indicated by a user as having a positive preference. However, the threshold for determining the association may vary without departing from the spirit and scope of the present disclosure.

In response to the preference for the physical object represented by the image being positive or favorable, the processing of the plurality of tags includes determining additional tags to add to the tags from the set of tags associated with the image. The additional tags further narrow down the current interest of the user by building upon the tags associated with the previous image, for which the user provided a positive preference.

To determine the one or more additional tags, the computer-implemented method or algorithm 200a processes the plurality of tags to determine the tags that have an association with the positive tags. By way of example, if the tags associated with the previous image include the tags meat and lunch, the computer-implemented method or algorithm 200a processes the plurality of tags to determine tags that are associated with meat and bun, such as the tags hamburger or hot dog rather than, for example, the tag cereal. Similar to above, the threshold for the association may be based on any number of factors or metrics, such as the number of times two tags are associated with the same image, the number of times a user indicates a certain preference (like or dislike) for an image, and the tags that are associated with the image, etc. However, the threshold for determining the association may vary without departing from the spirit and scope of the present disclosure.

Upon determining tags that satisfy a threshold association with one or more tags from the set of tags that are associated with an image that the user indicated a positive preference for, the computer-implemented method or algorithm 200a determines a next set of tags based on the next set of tags including at least one tag of the tags having the threshold association. Thus, if several tags are determined as having a threshold association with one or more tags that are associated with an image that the user indicated a positive preference for, one or more of those tags are selected and the next set of tags includes the one or more tags of those tags and the previous tags of the previous image. If more than one tag exists that satisfies the threshold association with a tag from the previous set of tags, the selection of which of the one or more tags to add to generate the next set of tags can vary. The selection can be random, such that, for example, one or more tags from a total of four tags are selected to be included in the next set of tags. Alternatively, the selection can be based on a weighting of the tags. The weighting can be determined based on one or more factors and/or metrics. According to one metric, the weighting can be based on which tag has the highest association with one tag, more than one tag, or all of the tags of the set of tags associated with the previous image that the user indicated a positive preference for. The association can be relative to all tags within the group or pool of tags, all tags that are relevant to the particular user (e.g., that the user indicated a preference for), or all tags within the same category of tags, such as meal, type of food, etc. However, the weighting can be based on any type of metric or schema, such as based on a profile of the user, physical objects associated with the tags having a threshold association, locations corresponding to the physical objects associated with the tags having a threshold association, entities corresponding to the physical objects associated with the tags having a threshold association, or a

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combination thereof. Once the weighting of the tags is determined, the one or more tags that are added to the set of tags associated with the previous image are selected such that the selected tags are the tags with the highest weighting.

As discussed above, the tags can be categorized generally as primary tags and secondary tags. An image can be associated with both primary tags and secondary tags. According to some embodiments, only tags within the plurality of tags that are primary tags are processed to determine additional primary tag(s) to add to the previous set of tags. Alternatively, all tags within the plurality of tags (e.g., primary and secondary) are processed to determine the additional tags to be added to the previous set of tags. Whether only primary tags are both primary tags and secondary tags are processed to determine additional tags to add to the set of tags associated with the previous image can be determined based on the number of images within a sequence that already have been presented to a user. For example, if the image is one of the first N images presented to the user, where N is 2, 3, 4, or 5, only the primary tags within the plurality of tags are processed to determine an additional tag to add to the previous set of tags. However, if the image is a later image presented to the user, such as the sixth, seventh, or eighth image within a session, both primary tags and secondary tags are processed to determine additional tags to add to the previous set of tags.

As discussed above, the preference that a user can indicate in response to being presented an image representing an object can be a positive preference or a negative preference. Additionally, the preference can be a neutral preference. In response to the preference indicated for an image being a neutral preference, the set of tags (e.g., combination of tags) that are associated with the image are logged and no set of tags (e.g., combination of tags) that include only that set of tags is subsequently presented to the user for the remainder of the session. Therefore, no image that is associated with a set of tags that includes only that set is presented to the user for the remainder of the session. Alternatively, in response to the preference being a neutral preference, the set of tags that are associated with the image are logged and no set of tags that include that set of tags, in addition to any other tags, is subsequently presented to the user for the remainder of the session. Accordingly, in response to a neutral preference, the computer-implemented method or algorithm 200a processes the plurality of tags and determines the next set of tags based on the next set of tags not including the one set of tags corresponding to the image, either alone or, alternatively, in any combination with additional tags, for a remainder of the session. Thus, sets of tags are logged that are associated with a neutral preference to narrow the possible next sets of tags and, therefore, images, that can be presented to the user.

In addition, according to some embodiments, and similar to the discussion above with respect to a negative preference, the sets of tags that can be excluded from the possible next set of tags can include sets of tags that include tags that satisfy a threshold association with one or more tags within the set of tags associated with a neutral preference.

Upon determining the set of tags based on the preference and the set of tags for the previous image, the computer-implemented method or algorithm 200a determines the next image to present to the user (208). The next image is an image from a plurality of images that is associated with the next set of tags. Multiple images can be associated with the same set of tags. Accordingly, the computer-implemented method or algorithm 200a selects a single image from the images that share the same set of tags. The criteria of the selection of the image can vary. The selection can be random, such that a random image is selected from the images that share the same

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set of tags. Alternatively, the selection may be based on a process or metric. As discussed above, the database **108** stores information pertaining to how many times the user has interacted with a specific tag and/or a specific image. The process or metric can include analyzing the number of interactions between the user and the images that share the same set of tags and selecting the image that has the highest number of interactions. The image with the highest number of interactions may offer a high likelihood that the user has a current interest in the physical object represented by the image. Alternatively, the process can include selecting the image that has the lowest number of interactions with the user. The interactions can include any interaction, such as any time the user was presented the image and regardless of the preference the user provided in response to the image. Alternatively, the interactions can be limited to only interactions where the user provided a specific preference, such as a positive preference, a negative preference, or a neutral preference. Alternatively, the process or metric may be based on the entity that is associated with the physical object that is represented by the image. Images that are associated with entities that have subscribed to the system **100** may be weighted higher than images that are associated with entities that have not subscribed to the system **100**. Thus, an image may be presented to a user, among multiple images that are associated with the same set of tags, if the image is associated with a subscribing entity.

The computer-implemented method or algorithm **200a** generates a sequence of images based on repeating the above process of at least presenting the image to the user and awaiting an input from the user regarding whether the user has a positive or negative, or neutral, preference for the physical object represented by the next image (210). The session of the computer-implemented method or algorithm **200a** continues each time the user provides a preference for the currently presented image, and determines the next set of tags and the next image to present based on the preference for the previous image and the set of tags associated with the previous image. The user providing the preferences narrows down the physical object that the user is currently interested in based on the set of tags associated with the images presented to the user that represent the various possible physical objects. The computer-implemented method or algorithm **200a** continues within a session as long as the user continues to provide inputs corresponding to the user's preferences to physical objects represented by images. Thus, according to some embodiments, the computer-implemented method or algorithm **200a** continues indefinitely or at least until the number of images and/or tags are exhausted during the session based on the processing discussed above. During the session, tags and sets of tags are removed based on negative or neutral responses, as described above. Thus, a session can end in the event that there are no more tags and/or images to present to a user. Alternatively, a single session of presenting a sequence of images can last until a predetermined number of images have been presented or displayed to the user or until a predetermined number of inputs have been received from the user. For example, a session of presenting images can last for 10 images. If the user has not yet determined a physical object that the user is currently interested in after the 10th image, the session ends, and the computer-implemented method or algorithm **200a** restarts a new session. Restarting a new session of the computer-implemented method or algorithm **200a** resets the removed tags, the sets of tags that were neutralized, or both from the previous session. For example, all of the plurality of tags and sets of tags that were initially available at the beginning of the computer-implemented method or algorithm **200a** are again available from which to determine new sets of

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tags and new images to present to the user. Alternatively, the session of the computer-implemented method or algorithm **200a** ends once the user selects an image that represents a physical object that the user is interested in, as described in more detail below.

FIG. 2B is a flowchart of a computer-implemented method or algorithm **200b** of determining, from among the entire pool of tags and the entire pool images, the plurality of tags and the plurality of images that are relevant for the user for a particular session and that are processed and analyzed for determining images to present to the user, using aspects of the present disclosure including the computer **102a**, the server **106**, and the database **108**. The computer-implemented method or algorithm **200b** can be a separate algorithm for purpose of implementation within the system **100** than the computer-implemented method or algorithm **200a**. Alternatively, the computer-implemented method or algorithm **200b** can be an extension or sub-routine of the computer-implemented method or algorithm **200a**.

The computer-implemented method or algorithm **200b** selects the plurality of tags that are processed for determining the next set of tags, discussed above in the computer-implemented method or algorithm **200a**, and from which an initial image is presented, from among the pool of tags within the database **108** (212). The plurality of tags is selected based on the plurality of tags matching one or more tags associated with a profile of the user. Thus, tags that are relevant to a user, according to the tags matching tags that are within the user's profile, are selected to be within the plurality of tags that are processed as discussed above in the computer-implemented method or algorithm **200a**. The tags that are selected are tags that have an exact match with tags within a user's profile. Alternatively, the tags that are selected are tags that have an exact match or that satisfy a threshold association with tags within the user's profile. The association can be based on any association described herein, such as the tags typically being associated with the same image based on trends of images and tags within the database **108**. The tags that are selected from among the pool of tags can be only primary tags, or the tags can be both primary tags and secondary tags. In some examples, primary and secondary tags have an equal weight, but in other examples, a primary tag can have a higher weight compared to a secondary tag.

The computer-implemented method or algorithm **200b** also determines a location associated with the user, the computer **102a** that is executing the application to perform the computer-implemented method or algorithm **200b**, or a combination thereof (214). The location associated with the computer **102a** can be determined automatically based on various functionality of the computer **102a**, such as a GPS (global positioning system) receiver within the computer **102a**. Alternatively, the location associated with the user and the computer **102a** can be determined based on the user manually entering a location within the computer **102a**. The location manually entered by the user can be a current location or a different location, such as a location that a user plans on being at during a certain time.

Based on the plurality of tags that are selected from the pool of tags, and the location of the user and/or the computer **102a**, the computer-implemented method or algorithm **200b** selects images from among the pool of images (216). The images are selected based on the images being associated with at least one tag of the plurality of tags that are selected from the pool of tags. Further, the images are selected based on each image being associated with the location of the user and/or the computer **102a**. The images are selected based on the location because, as discussed above, the location corre-

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sponds to the location of availability of the physical object that is represented by the image. Based on the computer-implemented method or algorithm 200b, the processing of the tags and the selection of the images within the computer-implemented method or algorithm 200a is limited to the tags that are relevant to the user and to the images that represent physical objects that are local to a specific location (e.g., current geographic location of user and/or computer 102a, or planned/expected location of the user and/or computer 102a).

The first image presented during a session of the computer-implemented method or algorithm 200a is an image within the pool of images. By way of example, the first image is randomly selected from among the plurality of images as a first image of the sequence of images. Alternatively, the first image can be an image from among the plurality of images that is associated with a high number of interactions with the user, either through direct interactions between the user and the image, such as the user indicating a preference in response to being presented an image, or through interactions between one or more tags associated with the image and the user. Alternatively, the first image presented to the user within a session of the computer-implemented method or algorithm 200a can be based on a search of the user for a specific tag, physical object, or entity that provides the physical object. For example with respect to food, the user can elect to begin a session of the computer-implemented method or algorithm 200a and enter the name of the physical object they seek, such as Chinese chicken salad. In response, the computer-implemented method or algorithm 200a searches for images within the database 108 containing one or more tags describing or characterizing Chinese chicken salad, enabling the user to search their geographic area for restaurants/vendors bearing that food item. At the same time, this functionality encourages restaurants (e.g., entities) associated with premium accounts to upload images of their food dishes, thereby making their food dishes searchable within the system 100 for all potential users within their local area.

FIG. 2C is a flowchart of a computer-implemented method or algorithm 200c of determining and/or updating associations between elements within the system 100, using aspects of the present disclosure including the computer 102a, the server 106, and the database 108. The computer-implemented method or algorithm 200c can be a separate algorithm for purpose of implementation within the system 100 than the computer-implemented method or algorithm 200a and 200b. Alternatively, the computer-implemented method or algorithm 200c can be an extension or a sub-routine of the computer-implemented method or algorithm 200a. During a session of generating a sequence of images by the computer-implemented method or algorithm 200a, the computer-implemented method or algorithm 200c logs the inputs from the user as interactions (218). The inputs are logged as interactions with the tags, the sets of tags, the images, the physical objects, and/or the entities associated with the physical objects for which the inputs apply. When a user provides an input of a preference associated with an image, the input is logged as applying to the image, the physical object represented by the image, one or more tags associated with the image, and/or the entity associated with the physical object. The input can be logged relative to only the user, or the input can be logged across all users.

The logging of the inputs allows the computer-implemented method or algorithm 200c to modify associations between the various informational elements within the system 100 (220). For example, the logging allows the computer-implemented method or algorithm 200c to modify associations tags, between sets of tags, and/or between an image and

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a tag and/or a set of tags based on the interactions. The associations can be modified relative to the user making the inputs, or the associations can be applied to all users. Accordingly, the associations discussed and used with the computer-implemented method or algorithms 200a and 200b are dynamic and constantly evolving based on the continued user inputs.

FIG. 3 is a diagram of a flow 300 illustrating the processing of a plurality of tags that are relevant to a user over the course of a session of the computer-implemented method or algorithm 200a. The flow begins with a set of tags 302. The set of tags 302 is associated with an image that is presented to the user at the computer 102a through execution of the application 114a. Specifically, the display device 112a displays the image that is associated with the set of tags 302. As shown, the set of tags 302 includes primary tags 302a and secondary tags 302b. The tags can be any of the above-described tags; however, for purposes of convenience, the tags are represented by alphabetical characters. Thus, the primary tags 302a of the tag 302 include the tags A, B, and C, and the secondary tags 302b of the tag 302 include the tags D and E.

In response to the presentation of the image associated with the set of tags 302, the user indicates, for example, a preference for the physical object represented by the image. As described above, the preference may be indicated through the user interface device 110a. For purposes of explanation, the preference is represented by the arrow 314a in FIG. 3. Specifically, the arrow 314a represents a preference for the image associated with the set of tags 302 that is negative.

Based on the negative preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 304 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the set of tags 304. The set of tags 304 includes the primary tags 304a F, G, and H, and the secondary tags 304b I and J. Because the user provided a negative preference in response to the physical object represented by the image that was associated with the set of tags 302, the set of tags 304 does not include any of the primary tags 302a. Specifically, the primary tags 302a of A, B, and C were removed from the plurality of tags that are processed to determine the next set of tags for the remainder of the session of the computer-implemented method or algorithm 200a.

Similar to above, in response to the presentation of the image associated with the set of tags 304, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow 316a in FIG. 3. Specifically, the arrow 316a represents a preference for the image associated with the set of tags 304 that is positive.

Based on the positive preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 306 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the set of tags 306. Because the user indicated a positive preference to the previous physical object represented by the image associated with the set of tags 304, the set of tags 306 includes the primary tags 306a F, G, H, and K, which are the primary tags 304a and the additional primary tag K. That is, the computer-implemented method or algorithm 200a builds upon the set of tags 304 based on the positive preference of the user by determining a set of tags

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that includes the previous primary tags and an additional primary tag (or more), and the corresponding image that the set of tags is associated with.

The set of tags **306** also includes the secondary tags **306b** D, E, and I. Despite the user indicating a negative preference for the set of tags **302**, which included the secondary tag D, the secondary tag D can be used again in a subsequent set of tags because the tag is a secondary tag. Alternatively, the secondary tags may also be removed from the plurality of tags that are processed, for the remainder of the session, to determine a next set of tags, instead of only the primary tags.

In response to the presentation of the image associated with the set of tags **306**, the user indicates a preference for the physical object represented by the image. For ease of explanation, the preference is represented by the arrow **314b** in FIG. 3. Specifically, the arrow **314b** represents a preference for the image associated with the set of tags **306** that is negative.

Based on the negative preference, the computer-implemented method or algorithm **200a** processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags **308** represents the next set of tags determined by the computer-implemented method or algorithm **200a**, and an image that is associated with the set of tags **308**. The set of tags **308** includes the primary tags **308a** F, G, H, and L, and the secondary tags **308b** M, N, and O. Because the user provided a negative preference in response to the physical object represented by the image that was associated with the set of tags **306**, the set of tags **308** does not include the primary tag that was added between the set of tags **304** (e.g., last positive preference) and the set of tags **306**, i.e., primary tag K. That is, the negative preference in response to the set of tags **306** is attributed to the addition of the primary tag K; thus, the primary tag K is removed from the plurality of tags for the remainder of the session such that no subsequent set of tags can include the primary tag K. The set of tags **308** also includes the secondary tags **308b** M, N, and O.

In response to the presentation of the image associated with the set of tags **308**, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow **318a** in FIG. 3. Specifically, the arrow **318a** represents a preference for the image associated with the set of tags **308** that is neutral.

Based on the neutral preference, the computer-implemented method or algorithm **200a** processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags **310** represents the next set of tags determined by the computer-implemented method or algorithm **200a**, and an image that is associated with the next set of tags **310**. The set of tags **310** includes the primary tags **310a** F, G, H, and P, and the secondary tags **310b** D, E, and O. Because the user provided a neutral preference in response to the physical object represented by the image that was associated with the set of tags **308**, the set of tags **310** does not include the primary tag that was added between the set of tags **306** (e.g., last positive preference) and the set of tags **308**, i.e., primary tag L. That is, the neutral preference in response to the set of tags **308** is attributed to the entire set of primary tags **308a**, including the primary tag K and the primary tags F, G, and H. Thus, the set of primary tags **308a** is removed from the plurality of tags that are processed, in the sense that the exact same set of primary tags **308a** can never be presented to the user again. However, the primary tag L is not removed from the plurality of tags for the remainder of the session such that subsequent sets of tags can include the primary tag L, as long as the set of tags is not

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the exact set of primary tag **308a**. The set of tags **310** also includes the secondary tags **310b** D, E, and O.

In response to the presentation of the image associated with the set of tags **310**, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow **316b** in FIG. 3. Specifically, the arrow **316b** represents a preference for the image associated with the set of tags **310** that is positive.

10 Based on the positive preference, the computer-implemented method or algorithm **200a** processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags **312** represents the next set of tags determined by the computer-implemented method or algorithm **200a**, and an image that is associated with the set of tags **312**. Because the user indicated a positive preference to the previous physical object represented by the image associated with the set of tags **310**, the set of tags **312** includes the primary tags **310a** F, G, H, P, Q, and R, which are the primary tags **310a** and the additional primary tags Q and R. That is, as described above, the computer-implemented method or algorithm **200a** builds upon the positive preference of the user by determining a set of tags that includes the previous primary tags and one or more additional primary tags, and the corresponding image that the set of tag is associated with.

15 The flow **300** continues until the user selects a physical object that is represented by a currently presented image, which corresponds to the last image that is presented within 20 the above sequence of images, is a physical object that the user would like to obtain. Alternatively, the flow **300** continues until the session is ended and restarted, for the reasons discussed above. In each case, when a session of the computer-implemented method or algorithm **200a** is started or 25 restarted, the plurality of tags and images that are processed are reset such that the tags and sets of tags that were removed from the plurality of tags are inserted back into the plurality of tags for processing.

30 The following figures use any of the aspects described above in connection with the foregoing FIGS. 1-3. These figures and accompanying description lay out some of the foundational aspects of the present disclosure, which the following figures show as mere exemplars of the many implementations contemplated by the present disclosure.

35 FIGS. 4A-4G illustrate user interfaces (UIs) **400a-400g**, respectively, that are presented on a computer device **102a** as part of an application **114a** executed on the computer device **102a** for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. 40 Referring to FIG. 4A, when starting a session of the computer-implemented method or algorithm, images appear one at a time and users interact with the images to populate a dynamic sequence of images. According to the various configurations of the system **100**, the images are pushed by the server **106**, from the database **108**, to the application **114a** on the computer **102a**. Alternatively, the images may be retrieved from the database **108** by the application **114a**, either directly or through the server **106**. Alternatively, the images may be contained within the application **114a** on the computer **102a**. FIG. 4A illustrates the main UI **400a** of the computer-implemented method or algorithm **200a**. As shown, the UI **400a** includes an image **402a**. The image **402a** represents a physical object. In the specific example of FIG. 4A, the image **402a** is a digital photograph of loaves of bread, which represents the physical object of bread and could have been taken by someone perusing a store or restaurant serving these loaves of bread and posted to an online social media 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 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networking service, for example. Below the image **402a** are user interface elements **404a** and **404b**. Specifically, the user interface elements **404a** and **404b** allow a user to enter inputs associated with the image **402a**, and the corresponding physical object represented by the image, for the user to provide a preference for the physical object represented by the image **402a**. For example, the user interface element **404a** is an icon of an X, which corresponds to a negative preference, and the user interface element **404b** is an icon of a checkmark, which corresponds to a positive preference. The UI **400a** also includes a main toolbar **406** that allows the user to navigate within the application **114a**. Within the main toolbar **406** are icons corresponding to functions of the application **114a**, including a Feed icon **406a**, a Restaurants icon **406b**, a Crave Search icon **406c**, and a My Profile icon **406d**. The Crave Search icon **406a** initiates a session of the computer-implemented process or algorithm **200a** that begins the process or algorithm for analyzing tags associated with a sequence of images presented to a user to present a current interest of the user. Thus, prior to the UI **400a** being presented in the display device **112a** or the computer **102a**, the user, for example, selected the Crave Search icon **406c**.

FIG. 4B shows a subsequent user interface after the UI **400a**. Specifically, upon the user selecting one of the user interface elements **404a** or **404b**, the UI **400a** transitions to UI **400b**. UI **400b** includes a new image **402b**. Like image **402a**, the image **402b** represents a physical object. In the specific example of FIG. 4B, the image **402b** is a digital photograph of beef stir-fry, which represents the physical object of a food dish of beef stir-fry. By way of example, the user may have selected the user element **404a** to indicate that the user has a negative preference (e.g., dislike) for the physical object of bread represented by the image **402a**. In response, the computer-implemented method or algorithm **200a** determined a next set of tags that does not include tags from the previous set of tags associated with the image **402a**, and determined an image (e.g., image **402b**) that is associated with the next set of tags to present to the user. Accordingly, the image **402b** of the beef stir-fry does not have the same primary tags as the primary tags associated with the image **402a** of the loaves of bread.

FIG. 4C shows a subsequent user interface after the UI **400b**. The UI **400c** of FIG. 4C may be after several rounds of the computer-implemented method or algorithm **200a** selecting next sets of tags and images associated with the next sets of tags, and receiving inputs from the user indicating preferences for the physical objects represented by the images. By way of explanation, the UI **400c** may be presented after an N number of images were previously presented. Thus, the UI **400c** includes a new image **402c**. Like images **402a** and **402b**, the image **402c** represents a physical object. In the specific example of FIG. 4C, the image **402b** is a digital photograph of sushi, which represents the physical object of a dish of sushi.

FIG. 4D shows a detailed view UI **400d** associated with the image **402c** in FIG. 4C.

By way of example, the UI **400c** transitions to the UI **400d** by the user selecting the image **402c** in the UI **400c**. The UI **400d** includes the same image **402c** in FIG. 4C. In addition, the UI **400d** includes user interface elements **408a** and **410a**. User interface element **408a** corresponds to a title or caption associated with the image **402c**. The title or caption of the user interface element **408a** is a text string that describes the physical object that is represented by the image **402c**. By way of example, where the image **402c** shows sushi, the user interface element **408a** includes the caption California sushi roll. User interface element **410a** lists the tags that are associated with the image **402c**. The user interface element **410a**

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allows a user to directly see the tags that are associated with the image **402c** and, therefore, also associated with the physical object that is represented by the image **402c**. By way of example, the user interface element **410a** includes the tags sushi, roll, raw, Japanese, vegetable, and cold.

FIG. 4E shows a UI **400e** that includes a recommendation for a restaurant based on the currently presented image **402d**, which is presented based on the computer-implemented process or algorithm **200a**. For example, the user may have indicated a negative preference or dislike in response to being presented the image **402c**. Based on reverting back to the tags that were last associated with a positive response (for example, **402b**), the computer-implemented process or algorithm **200a** may have determined the image **402d** as the next image to present to the user. Similar to the UI **400d**, the UI **400e** includes a detailed view associated with the currently presented image **402d**. As shown, the image **402d** shows a digital photograph of pork chops, which is indicated by the user interface element **408b**. Specifically, the user interface element **408b** shows the caption of Pork Chops with Ripieno. The UI **400e** further includes the user interface element **410b**, which provides the tags that are associated with the image **402d**. As shown, the tags include herbs, wok, breadcrumbs, pork chops, and dinner. Further, the UI **400e** includes the user interface element **412**. The user interface element **412** provides an indication of a number entities within the area, for example, defined by the location of the user, the computer **102a**, or both, that offer the physical object that is associated with the image **402a**. Specific to the illustrated example, the user interface element **412** indicates the number of restaurants within the location of the user that offer the food dish that is represented by the image **402d**. As shown, there are 15 restaurants within a threshold location of the user that offer the food dish of pork chops with ripieno that is associated with the image **402d**.

The user interface element **412** may be presented to the user within the UI **400e** in response to the user providing an indication that the user is interested in obtaining the physical object associated with the image **402d**. Such an indication can be provided according to various methods, such as the user double tapping or selecting the image **402d**. In response, the application **114a** presents the user interface element **412** within the UI **400e**. Thus, once a user is guided to a physical object that the user is interested in, such as craving in the case of a food dish, the computer-implemented process or algorithm **200a** allows the user to obtain information on entities that offer the physical object. In this case, the entities are the 15 restaurants. In response to the user selecting the user interface element **412**, the application **114a** causes a transition between the UI **400e** and the UI **400f**.

FIG. 4F shows the UI **400f**, which includes a list of recommended entities that offer the physical object that the user indicated as being interested in obtaining additional information in. The UI **400f** includes a list of entities **414a-414g**, specifically restaurants, that offer the physical object associated with the image **402d**. From the UI **400f**, the user is able to choose a specific entity from the list of entities **414a-414g**. Upon selecting an entity, such as the first entity associated with the first user interface element **414a**, the application **114a** causes a transition between the UI **400f** to the UI **400g**.

FIG. 4G shows a UI **400g** that provides information regarding a specific entity that offers the physical object associated with the image **402d**. In the case of a restaurant, the UI **400g** includes an image **416** of the exterior of the restaurant. Below the image **416**, the UI **400g** includes the name of the restaurant and the address of the restaurant. The UI **400g** also includes a user interface element **418**. The user interface

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element 418 can be associated with a hyperlink to a website that is associated with the restaurant. Alternatively, the user interface element 418 may direct the user to a landing site within the application for restaurant. The landing site for the restaurant may provide information regarding the restaurant, such as the information that is contained with the restaurant profile stored within the database 108. According to some embodiments, the landing site for the restaurant may allow a user to purchase the food dish through the application 114a, rather than being directed to an Internet web site from which the user can purchase the food dish.

FIG. 4H shows a UI 400h for a user to upload and associate an image of a physical object into the system 100, such as stored within the database 108 of the system 100. The UI 400h includes an area 420 to display the image that will be associated with the physical object. The image can be obtained according to various methods, such as a camera integrated within the computer 102a, such as in the case of a smartphone, or by linking to an image on the Internet or saved in a memory device of the computer 102a. Similar to the UI 400f, the UI 400h also includes a user interface element 422 that allows a user to insert a title or a caption for the image. The UI 400h also includes a user interface element 424 to associate the image within the area 420 with one or more tags that describe the physical object represented by the image. The UI 400h also includes a user interface element 426 to associate a location with the image and the physical object. The location can either be determined automatically, such as through components and/or modules within the computer 102a (e.g., Global Positioning System receivers), or can be manually entered by the user.

FIG. 4I illustrates the UI 400i as the user enters information within the user interface elements 422 and 422. For example, the user may be uploading an image of a food dish. The food dish may specifically be beef stir-fry. The user may have selected the tags hot, wok, and Chinese to describe the food dish (e.g., physical object) represented by the image. To select the tags and enter the caption, the UI 400i includes a virtual keyboard 428. However, the user can enter the text according to various other user interface devices. Once the user has completed entering the information, the image is uploaded to the database 108. FIG. 4J shows the UI 400j that includes the user interface element 430, which indicates a successful upload of the image and the associated information, such as the tags, the caption, and the location.

FIGS. 4K and 4L show user interfaces associated with a user viewing aspects of the user's profile. Specifically, FIG. 4K shows UI 400k associated with a user profile, including the tags that the user is associated with based on the user interface element 432. As shown, the user profile indicates that the user is associated with the tags Talian, Asian, Burger joints, Romantic, Delivery, Music, Healthy food, Fresh, among other tags. The tags are associated with the user by the user manually selecting certain tags from all of the tags that are stored in the database 108 that the user has a positive preference for (e.g., likes). Alternatively, the tags are associated with the user implicitly by the user's interaction with the tags over time, such as the user having the habit of selecting images and/or physical objects that the user prefers that are associated with the tags in the user interface element 432. The UI 400k also includes images (e.g., digital photographs) that the user has provided a positive preference for (e.g., liked) during interaction with the application 114a.

FIG. 4L includes the UI 4001 that shows at least some additional aspects of the user's profile. For example, the UI 4001 includes user interface elements 436 and 438. The user interface element 436 includes social media information

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regarding the user, such as an icon of the user, the user's location (e.g., city and state), and how many users the user is following and are following the user. The user interface element 438 includes images that the user has uploaded into the system 100, such as through the flow illustrated in FIGS. 4H-4J. The UI 4001 can include other information within the system 100, not just the information specifically referenced herein with respect to FIGS. 4A-4L. For example, the UI 4001 can include a feature for users called The Top 100, which highlights the top rated images and/or physical objects associated with the images at any given moment. The Top 100 images can be out of all of the images stored within the database 108, all of the images within the database 100 that are relevant to the user based on the images being associated with tags that the user has liked, or all of the images of physical objects that are offered within a pre-defined area surrounding the user's current location. The images representing the physical objects with the most positive preferences will be featured on The Top 100, which provides users the incentive to upload physical objects (e.g., such as food dishes) that are their favorite physical objects. For example, this will encourage users to share their best meals in the hopes of being in The Top 100. The Top 100 list allows users to gain attention. In the social media realm, the applications 114a, 114b allow users to attract more followers as well as support, for example, their favorite restaurants (e.g., entities). The Top 100 lists will also be active, allowing user to select an image within The Top 100 list to be taken to a page associated with a profile of the entity that offers the physical object represented by the image.

While this disclosure is susceptible to various modifications and alternative forms, specific embodiments or implementations have been shown by way of example in the drawings and will be described in detail herein. It should be understood, however, that the disclosure is not intended to be limited to the particular forms disclosed. Rather, the disclosure is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention(s) as defined by the appended claims.

Each of these embodiments, and obvious variations thereof, is contemplated as falling within the spirit and scope of the claimed invention(s), which are set forth in the following claims. Moreover, the present concepts expressly include any and all combinations and sub-combinations of the preceding elements and aspects.

What is claimed is:

1. A computer-implemented method comprising:
receiving, from an electronic device associated with a user, an indication of an instance of an application executed on the electronic device, wherein the application, together with one or more computer devices, is configured to direct the user to a current interest associated with a category of physical objects;
determining, by the one or more computer devices, a plurality of tags specific to the user, from among a pool of tags, based on each tag of the plurality of tags specific to the user being associated with a profile of the user;
transmitting, from the one or more computer devices, one electronic image, from among a plurality of electronic images stored on the one or more computer devices, to the electronic device, the one electronic image representing a physical object within the category of physical objects and being associated with one set of tags from the plurality of tags specific to the user, each tag of the one set of tags describing or characterizing attributes of the physical object represented by the one electronic image;

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causing a presentation of only the one electronic image from among the plurality of electronic images on a display of the electronic device;

receiving, from the electronic device, an input from the user indicating a preference for the physical object represented by the one electronic image;

processing, by the one or more computer devices, the plurality of tags specific to the user based on the preference and the one set of tags to determine a next set of tags from the plurality of tags specific to the user, the processing including:

in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being a first electronic image presented to the user during a session of directing the user to the current interest, removing the tags of the one set of tags from the plurality of tags specific to the user that are processed to determine the next set of tags, for a remainder of the session of directing the user to the current interest;

in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being not the first electronic image presented to the user during the session of directing the user to the current interest, removing tags of the one set of tags that are new relative to an immediately previous set of tags from the plurality of tags specific to the user that are processed to determine the next set of tags, for the remainder of the session of directing the user to the current interest; and

in response to the preference for the physical object represented by the one electronic image being positive, determining at least one additional tag from the plurality of tags specific to the user to add to the one set of tags, generating the next set of tags, the determining the at least one additional tag comprising:

determining weightings of the tags within the plurality of tags specific to the user based, at least in part, on (i) a number of times each tag of the plurality of tags specific to the user appears with at least one of the one or more tags of the one set of tags for the plurality of electronic images, and (ii) a number of times each tag of the plurality of tags specific to the user is associated with a positive and/or a negative preference by the user; and

determining the at least one additional tag based on the at least one additional tag having a highest weighting among the plurality of tags specific to the user;

determining, by the one or more computer devices, a next electronic image from the plurality of electronic images associated with the next set of tags, the next electronic image representing a different physical object within the category of physical objects and the next set of tags describing or characterizing attributes of the different physical object represented by the next electronic image; and

generating a sequence of electronic images presented to the user one at a time on the display of the electronic device by repeating the transmitting, the causing, the receiving of the input, the processing, and the determining of the next electronic image during the session with the next electronic image in place of the one electronic image to direct the user to the current interest associated with the category of physical objects.

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2. The method of claim 1, wherein the one set of tags includes primary tags and secondary tags, and the tags removed from the plurality of tags specific to the user are only the primary tags.

3. The method of claim 1, in response to the preference for the physical object represented by the one electronic image being negative, the processing of the plurality of tags further comprising:

determining tags, from the plurality of tags specific to the user are, having a threshold association with one or more tags of the one set of tags; and

removing the tags having the threshold association from the plurality of tags specific to the user are that are processed to determine the next set of tags, for the remainder of the session.

4. The method of claim 1, wherein the weightings of the tags is based, at least in part, on the profile of the user, physical objects associated with the tags satisfying a threshold association, locations corresponding to the physical objects associated with the tags satisfying a threshold association, entities corresponding to the physical objects associated with the tags satisfying a threshold association, or a combination thereof.

5. The method of claim 1, in response to the preference for the physical object represented by the one electronic image being neutral, the processing of the plurality of tags comprising:

determining the next set of tags based on the next set of tags not including the one set of tags corresponding to the electronic image, for a remainder of the session.

6. The method of claim 5, in response to the preference for the physical object represented by the one electronic image being neutral, the processing of the plurality of tags further comprising:

determining tags, from the plurality of tags specific to the user are, having a threshold association with one or more tags of the one set of tags; and

determining the next set of tags based on the next set of tags not including a tag from the one set of tags and a tag from the tags having the threshold association, for the remainder of the session.

7. The method of claim 1, further comprising:

selecting the plurality of electronic images from the pool of electronic images based on each electronic image of the plurality of electronic images being associated with at least one tag of the plurality of tags specific to the user are.

8. The method of claim 7, further comprising:

randomly selecting the one electronic image from among the plurality of electronic images as a first electronic image of the sequence of electronic images of the session.

9. The method of claim 1, further comprising:

determining a location associated with the user, the electronic device, or a combination thereof; and

selecting the plurality of electronic images from the pool of electronic images based on each electronic image of the plurality of electronic images being associated with the location.

10. The method of claim 1, further comprising:

logging the one or more inputs during the generating of the sequence of electronic images as interactions of the user with one or more tags, one or more sets of tags, one or more electronic images, one or more physical objects, one or more physical entities associated with the physical objects, or a combination thereof.

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11. The method of claim 10, further comprising: modifying associations between (1) tags, (2) sets of tags, (3) an electronic image and a tag, a set of tags, or a combination thereof, or (4) a combination thereof based on the interactions. 5

12. The method of claim 1, further comprising: receiving, via the user interface of the electronic device, an input by the user indicating that a last electronic image of the sequence of electronic images presented to the user represents the current interest of the user. 10

13. The method of claim 12, further comprising: determining a location associated with the user, the electronic device, or a combination thereof; and presenting, via the display of the electronic device, a list of physical entities proximate the location that provide a 15 physical object represented by the last electronic image. 15

14. The method of claim 13, further comprising: receiving, via the user interface of the electronic device, an input by the user selecting one of the physical entities provided in the list; and presenting, via the display of the electronic device, a user interface element displaying a profile associated with the selected physical entity. 20

15. One or more computer-readable, non-transitory, storage media encoding machine-readable instructions that, when executed by one or more computers, cause operations to be carried out, the operations comprising: receiving, from an electronic device associated with a user, an indication of an instance of an application executed on the electronic device, wherein the application, 30 together with one or more computer devices, is configured to direct the user to a current interest associated with a category of physical objects; determining, by the one or more computer devices, a plurality of tags specific to the user, from among a pool of tags, based on each tag of the plurality of tags specific to the user being associated with a profile of the user; transmitting, from the one or more computer devices, one 35 electronic image, from among a plurality of electronic images stored on the one or more computer devices, to the electronic device, the one electronic image representing a physical object within the category of physical objects and being associated with one set of tags from the plurality of tags specific to the user, each tag of the one set of tags describing or characterizing attributes of 40 the physical object represented by the one electronic image; causing a presentation of only the one electronic image from among the plurality of electronic images on a display of the electronic device; 50 receiving, from the electronic device, an input from the user indicating a preference for the physical object represented by the one electronic image; processing, by the one or more computer devices, the plurality of tags specific to the user based on the preference and the one set of tags to determine a next set of tags from the plurality of tags specific to the user, the processing including: 55

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in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being a first electronic image presented to the user during a session of directing the user to the current interest, removing the tags of the one set of tags from the plurality of tags specific to the user that are processed to determine the next set of tags, for a remainder of the session of directing the user to the current interest; in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being not the first electronic image presented to the user during the session of directing the user to the current interest, removing tags of the one set of tags that are new relative to an immediately previous set of tags from the plurality of tags specific to the user that are processed to determine the next set of tags, for the remainder of the session of directing the user to the current interest; and in response to the preference for the physical object represented by the one electronic image being positive, determining at least one additional tag from the plurality of tags specific to the user to add to the one set of tags, generating the next set of tags, the determining the at least one additional tag comprising: determining weightings of the tags within the plurality of tags specific to the user based, at least in part, on (i) a number of times each tag of the plurality of tags specific to the user appears with at least one of the one or more tags of the one set of tags for the plurality of electronic images, and (ii) a number of times each tag of the plurality of tags specific to the user is associated with a positive and/or a negative preference by the user, and determining the at least one additional tag based on the at least one additional tag having a highest weighting among the plurality of tags specific to the user; determining, by the one or more computer devices, a next electronic image from the plurality of electronic images associated with the next set of tags, the next electronic image representing a different physical object within the category of physical objects and the next set of tags describing or characterizing attributes of the different physical object represented by the next electronic image; and generating a sequence of electronic images presented to the user one at a time on the display of the electronic device by repeating the transmitting, the causing, the receiving of the input, the processing, and the determining of the next electronic image during the session with the next electronic image in place of the one electronic image to direct the user to the current interest associated with the category of physical objects.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9,323,786 B2
APPLICATION NO. : 14/827205
DATED : April 26, 2016
INVENTOR(S) : Sydney Nicole Epstein et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims:

On Column 28, Lines 9-10 (Claim 3), after “specific to the user” delete the word “are”;

On Column 28, Line 13 (Claim 3), after “specific to the user” delete the word “are”;

On Column 28, Lines 34-35 (Claim 6), after “specific to the user” delete the word “are”; and

On Column 28, Lines 45-46 (Claim 7), after “specific to the user” delete the word “are”.

Signed and Sealed this
Ninth Day of August, 2016



Michelle K. Lee
Director of the United States Patent and Trademark Office

Exhibit B

to

Complaint for Patent Infringement

The '705 Patent



US010474705B2

(12) **United States Patent**
Epstein et al.

(10) **Patent No.:** **US 10,474,705 B2**
(b4) **Date of Patent:** ***Nov. 12, 2019**

(54) **ITERATIVE IMAGE SEARCH ALGORITHM INFORMED BY CONTINUOUS HUMAN-MACHINE INPUT FEEDBACK**

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(72) Inventors: **Sydney Nicole Epstein**, Dix Hills, NY (US); **Paul Lawrence Epstein**, Dix Hills, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Oct. 16, 2018**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
G06Q 30/00 (2012.01)
G06F 16/33 (2019.01)
(Continued)

(52) **U.S. Cl.**
CPC **G06F 16/334** (2019.01); **G06F 3/04842** (2013.01); **G06F 16/51** (2019.01);
(Continued)

(58) **Field of Classification Search**
CPC G06F 17/30; G06F 16/334; G06F 16/51; G06F 16/58; G06F 3/04842;
(Continued)

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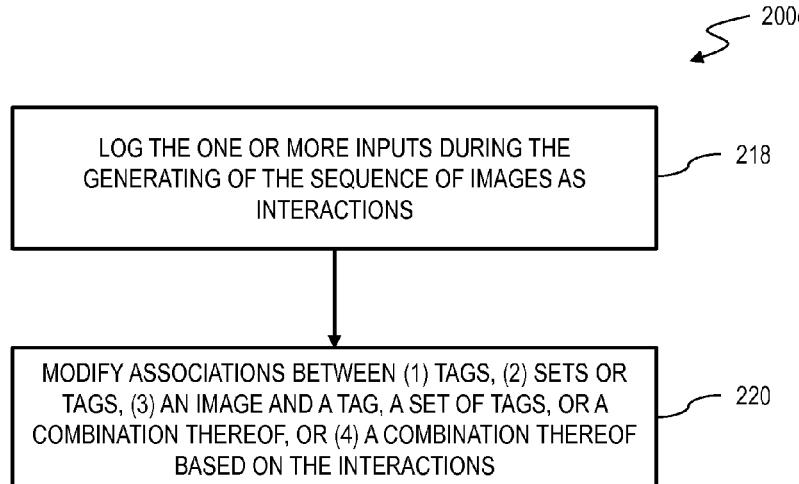
Primary Examiner — Robert M Pond

(74) *Attorney, Agent, or Firm* — Nixon Peabody LLP

(57) **ABSTRACT**

System and computer-implemented method of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user is disclosed. An image from among a plurality of images is presented on an electronic display. The image is associated with a set of tags. An input is received indicating a user's preference for the image. A plurality of tags is processed based on the preference and the set of tags to determine a next set of tags from the plurality of tags. A next image is determined from the plurality of images based on the next set of tags. The next image represents a physical object, different from a physical object represented by the previous image. A sequence of images is generated by repeating the above process with the next image in place of the previous image for present a user's current interest.

11 Claims, 10 Drawing Sheets



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Related U.S. Application Data

No. 15/070,371, filed on Mar. 15, 2016, now Pat. No. 9,779,160, which is a continuation of application No. 14/827,205, filed on Aug. 14, 2015, now Pat. No. 9,323,786.

(60) Provisional application No. 62/037,788, filed on Aug. 15, 2014.

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G06F 3/0484 (2013.01)
G06Q 30/06 (2012.01)
G06F 16/51 (2019.01)
G06F 16/58 (2019.01)
H04W 4/021 (2018.01)

(52) U.S. Cl.

CPC *G06F 16/58* (2019.01); *G06F 16/5866* (2019.01); *G06Q 30/0631* (2013.01); *H04L 67/306* (2013.01); *H04W 4/021* (2013.01)

(58) Field of Classification Search

CPC .. G06F 16/5866; G06F 3/0484; H04W 4/021; H04W 4/02; H04L 67/306; H04L 29/08; G06Q 30/0631; G06Q 30/06

USPC 705/26, 27
 See application file for complete search history.

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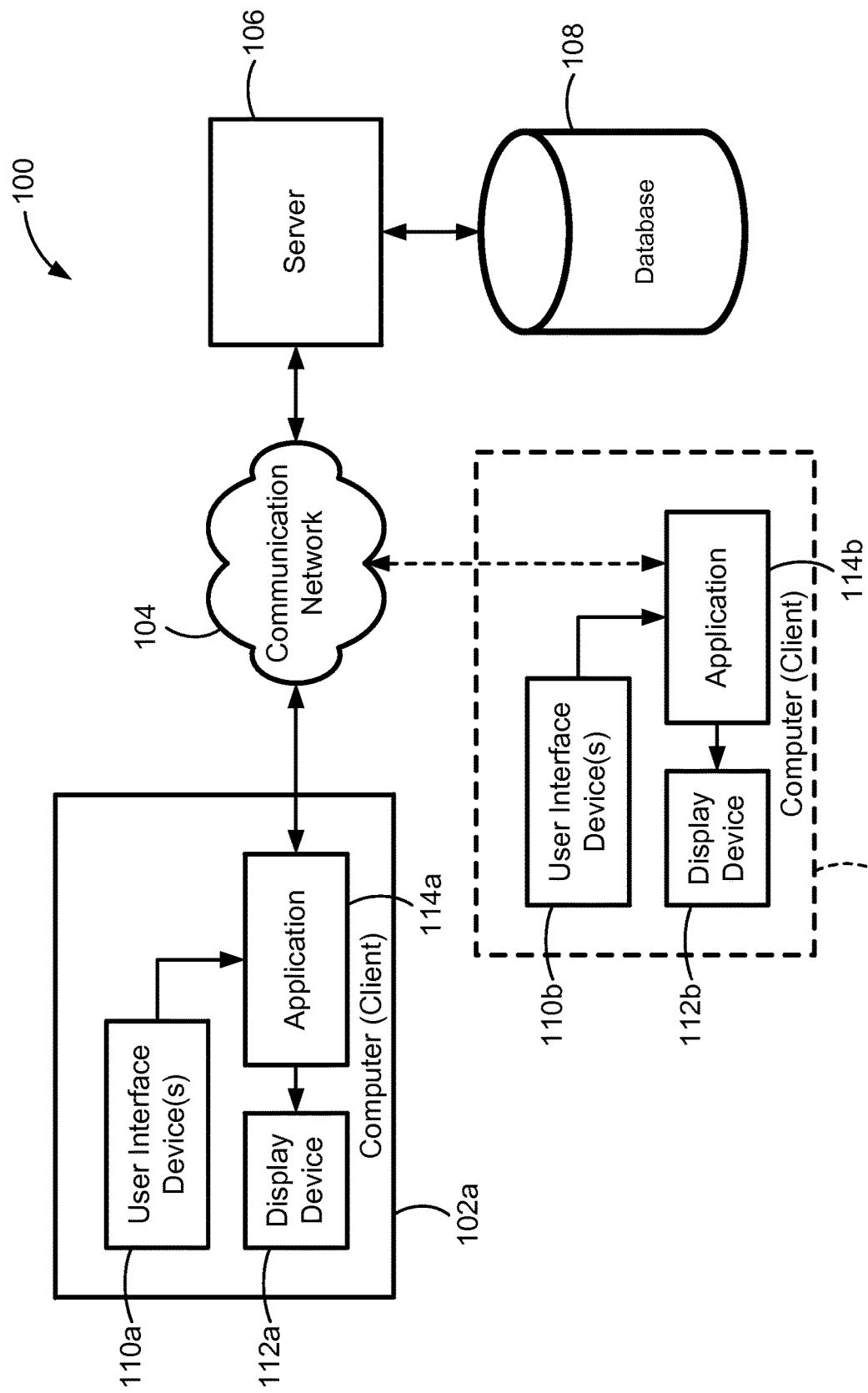
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**FIG. 1**

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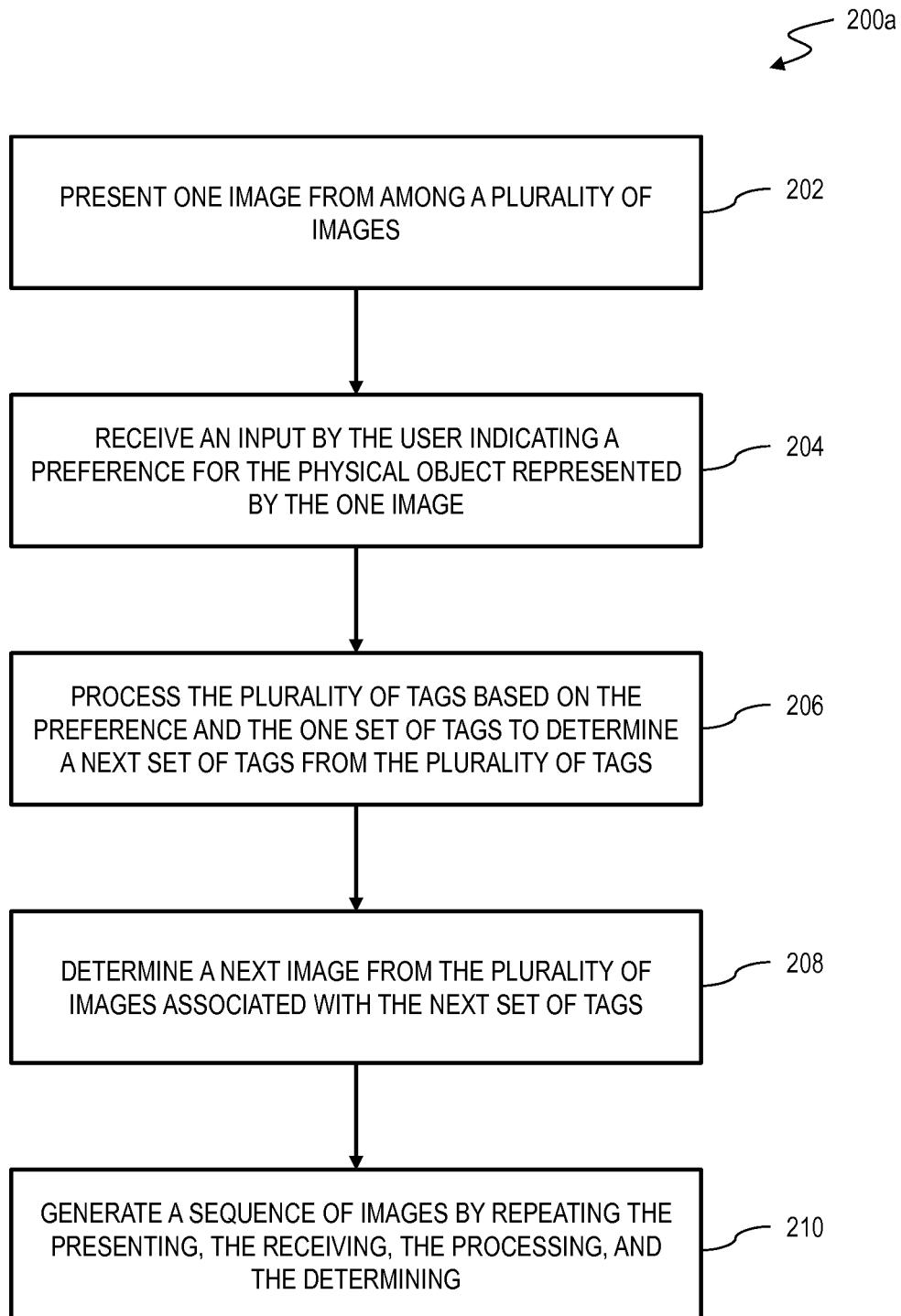


FIG. 2A

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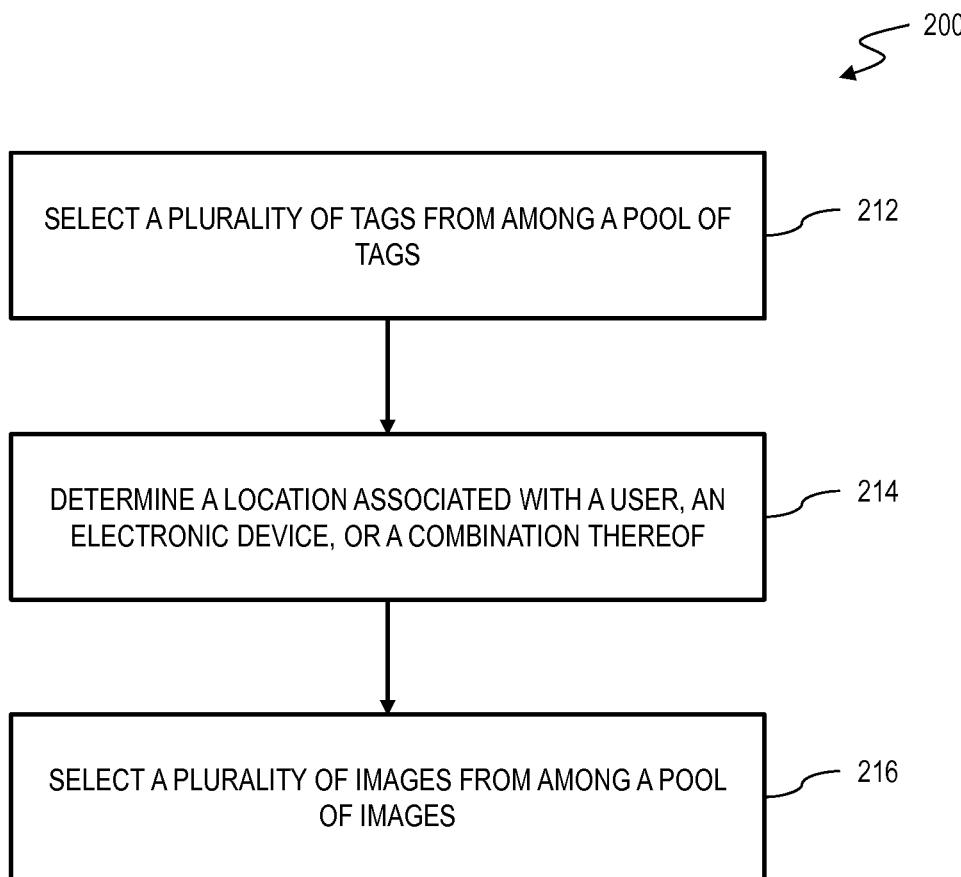


FIG. 2B

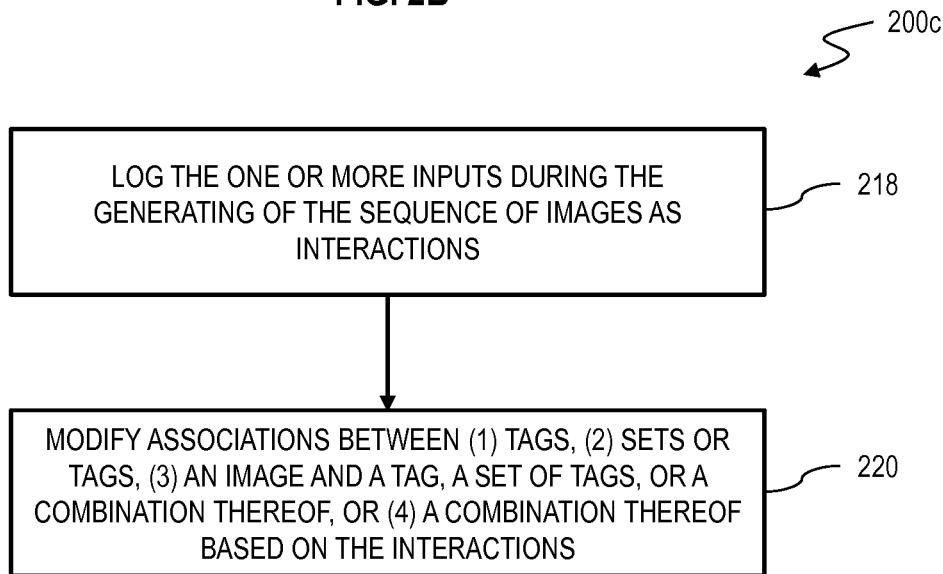


FIG. 2C

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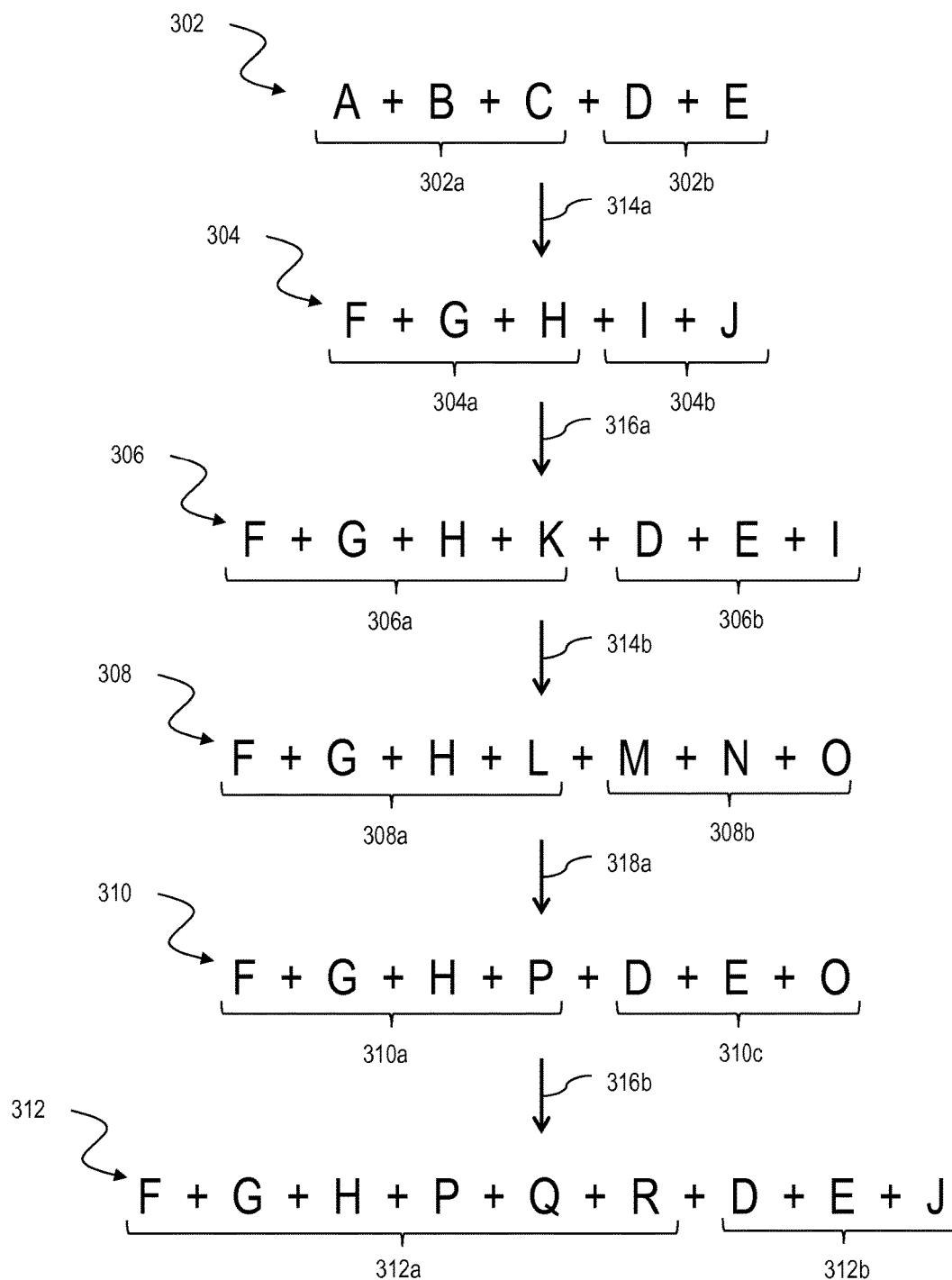


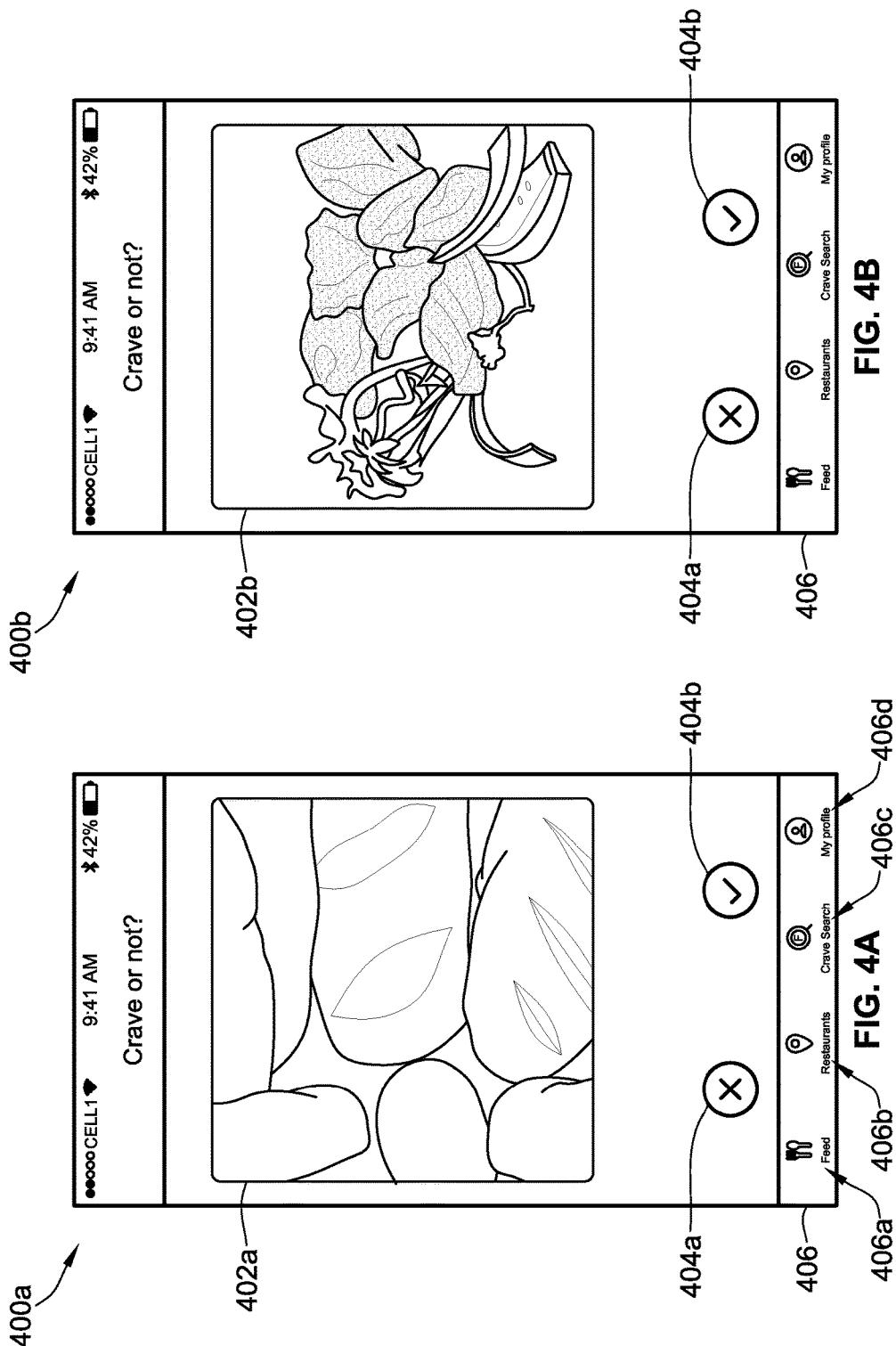
FIG. 3

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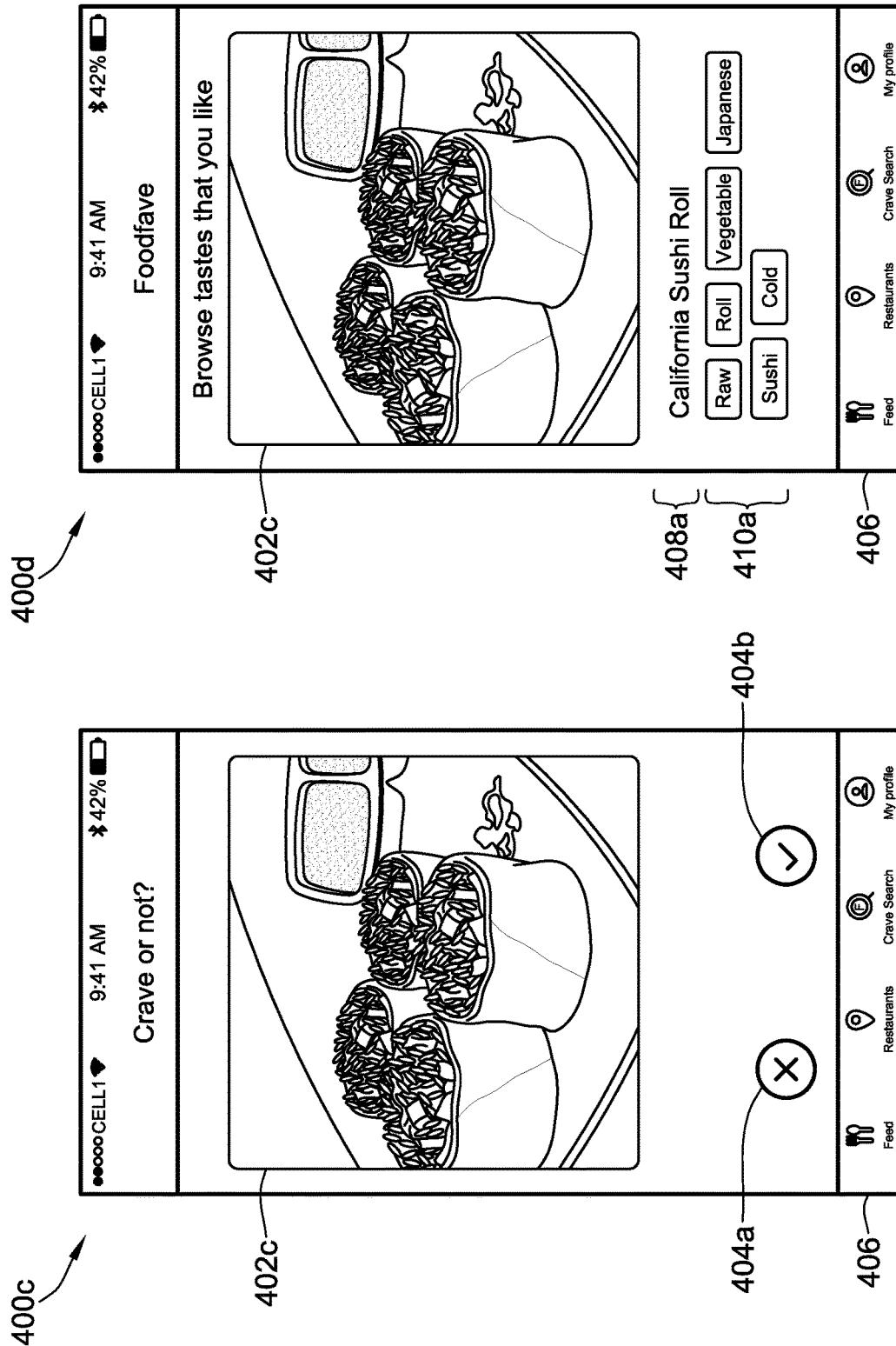


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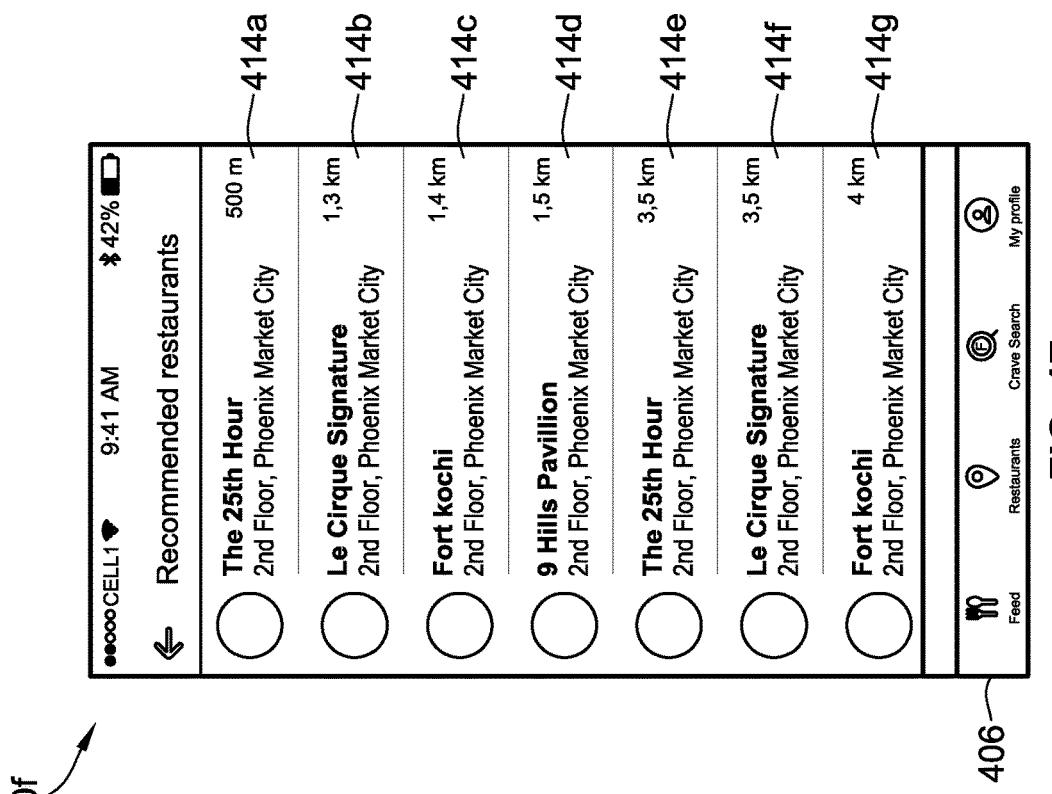


FIG. 4F

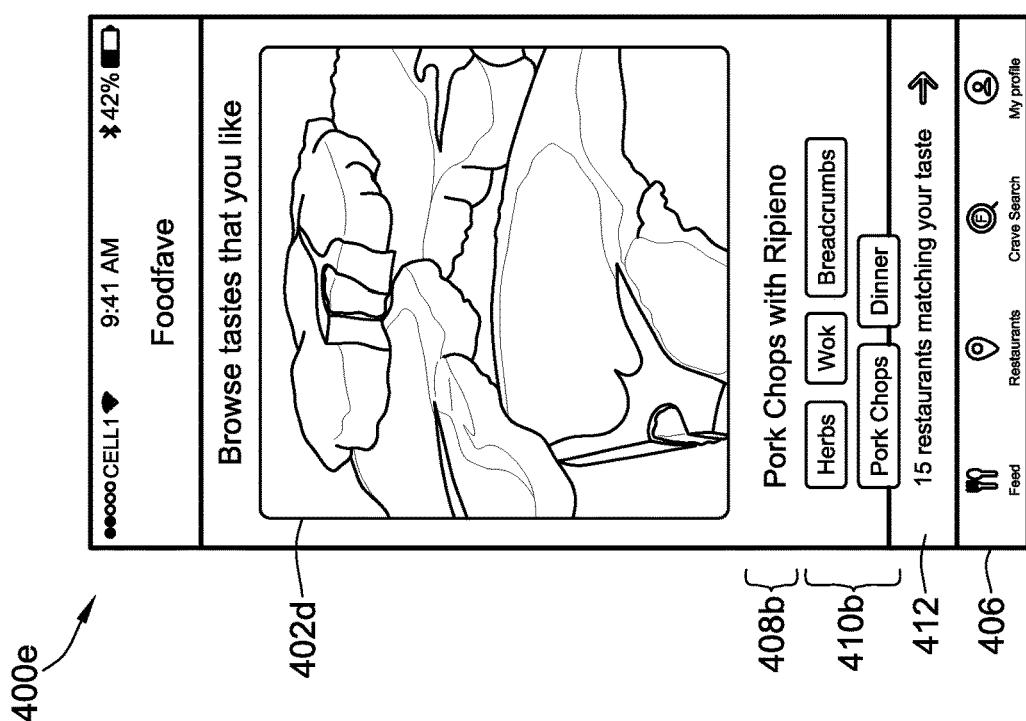


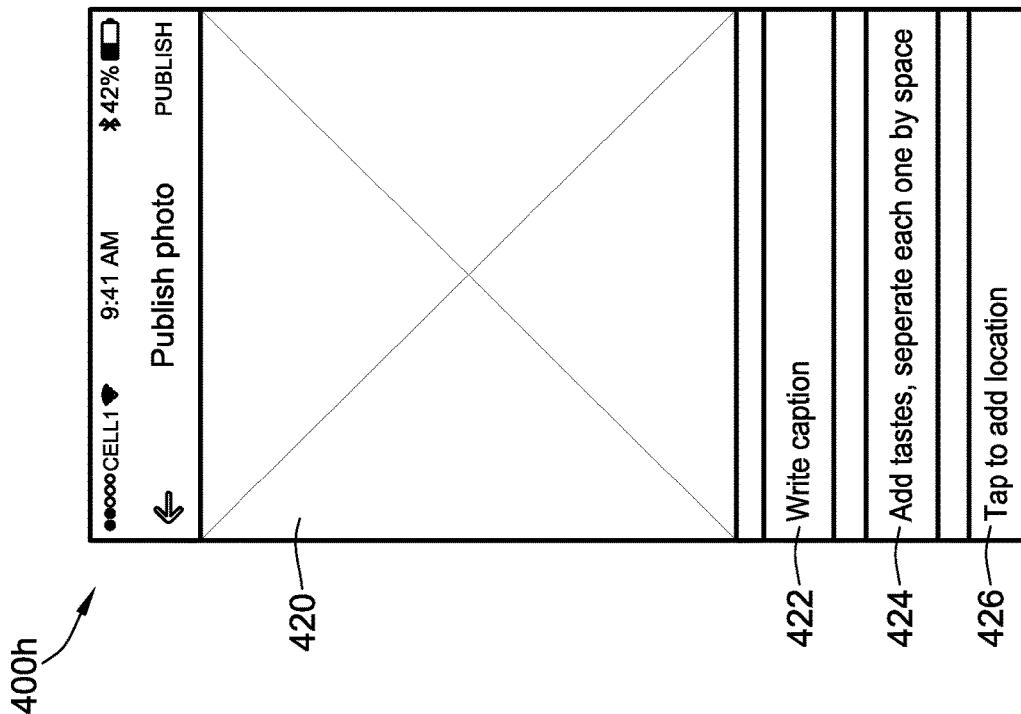
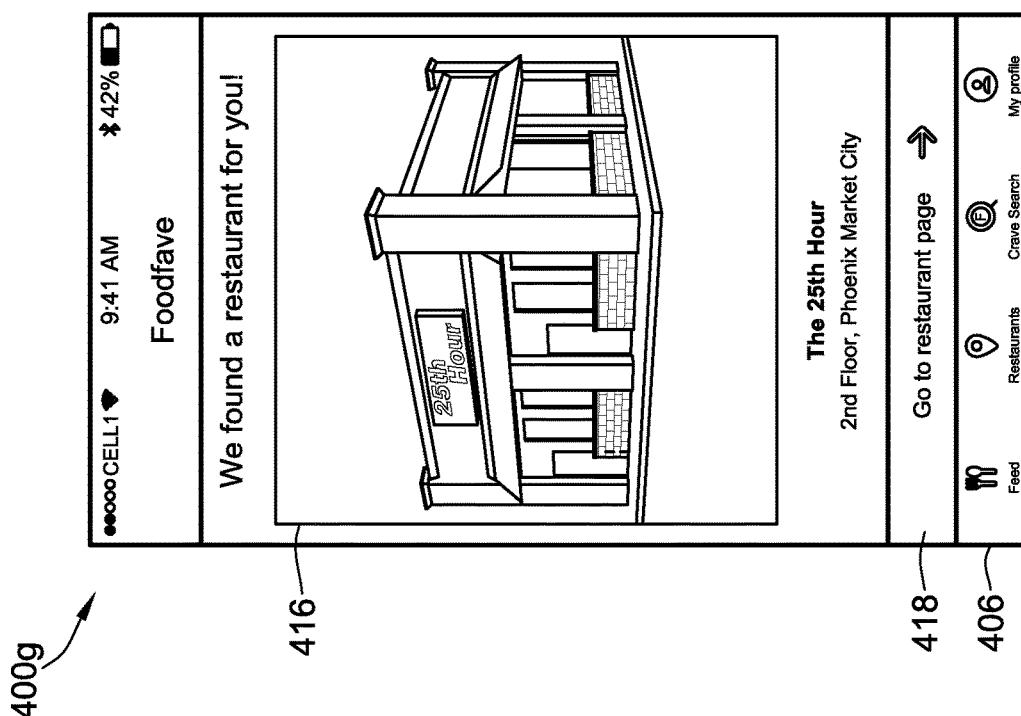
FIG. 4E

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**FIG. 4H****FIG. 4G**

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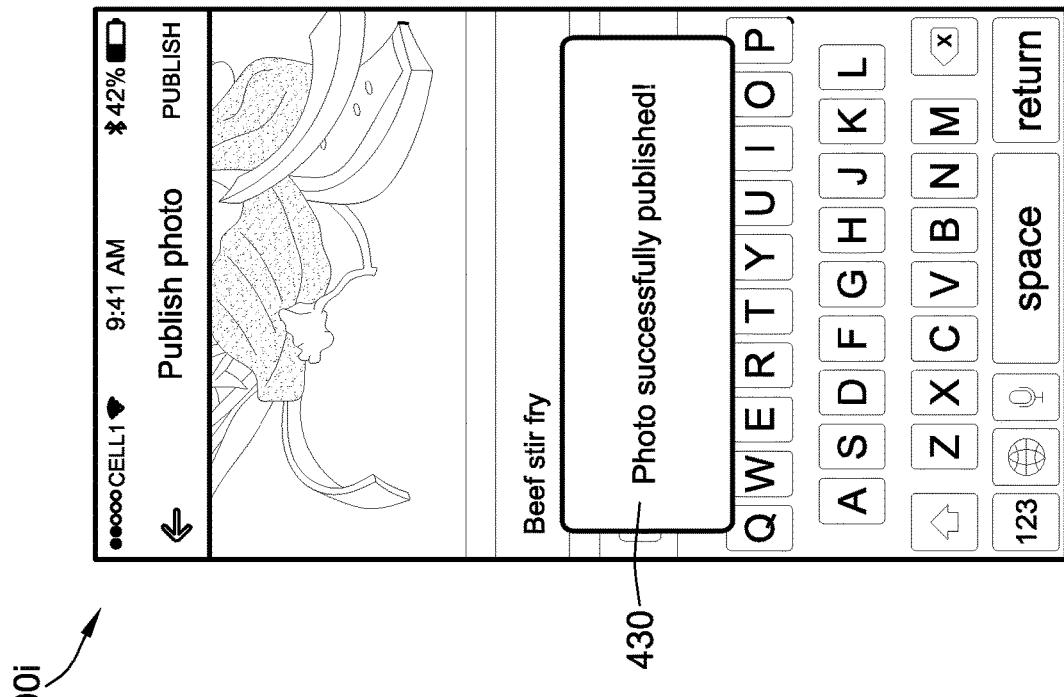


FIG. 4J

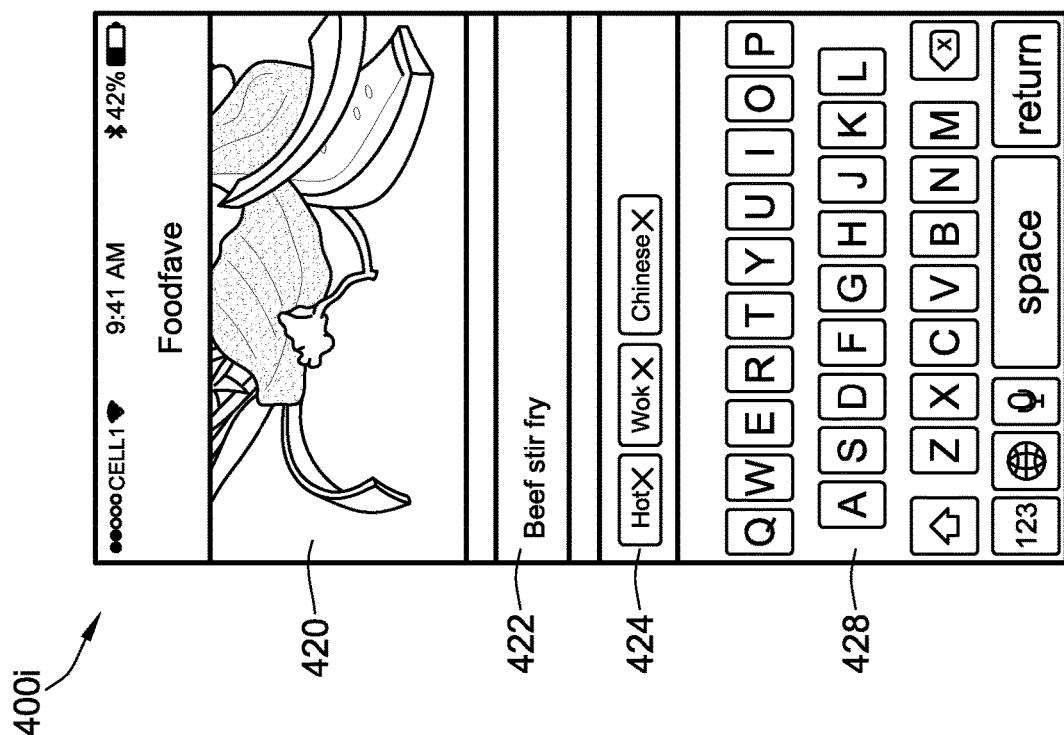


FIG. 4I

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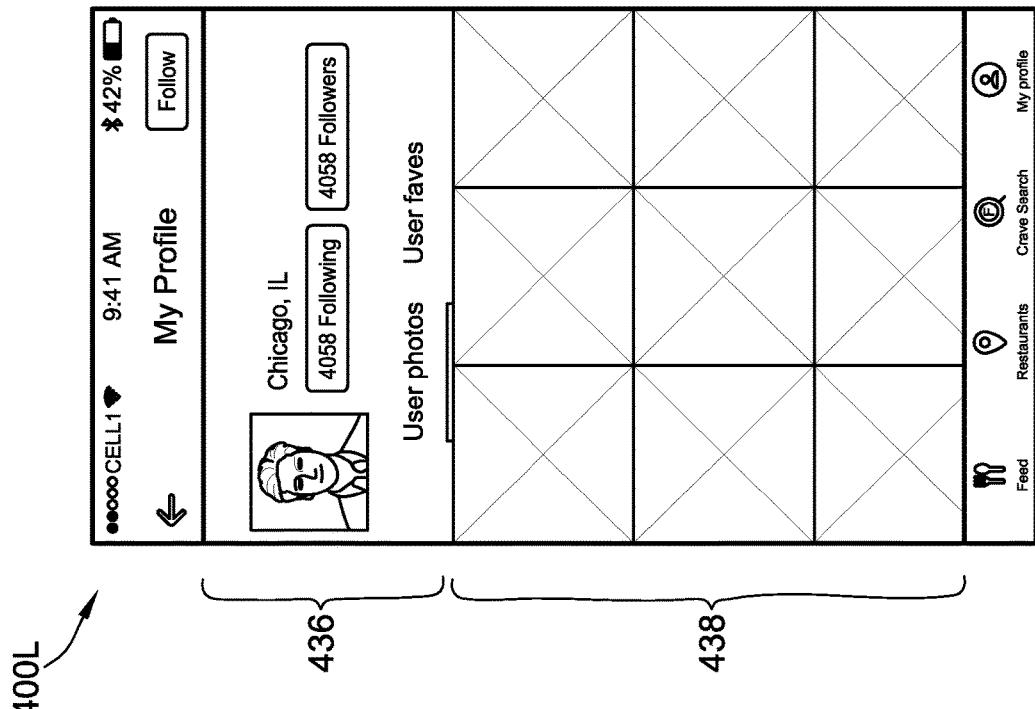


FIG. 4L

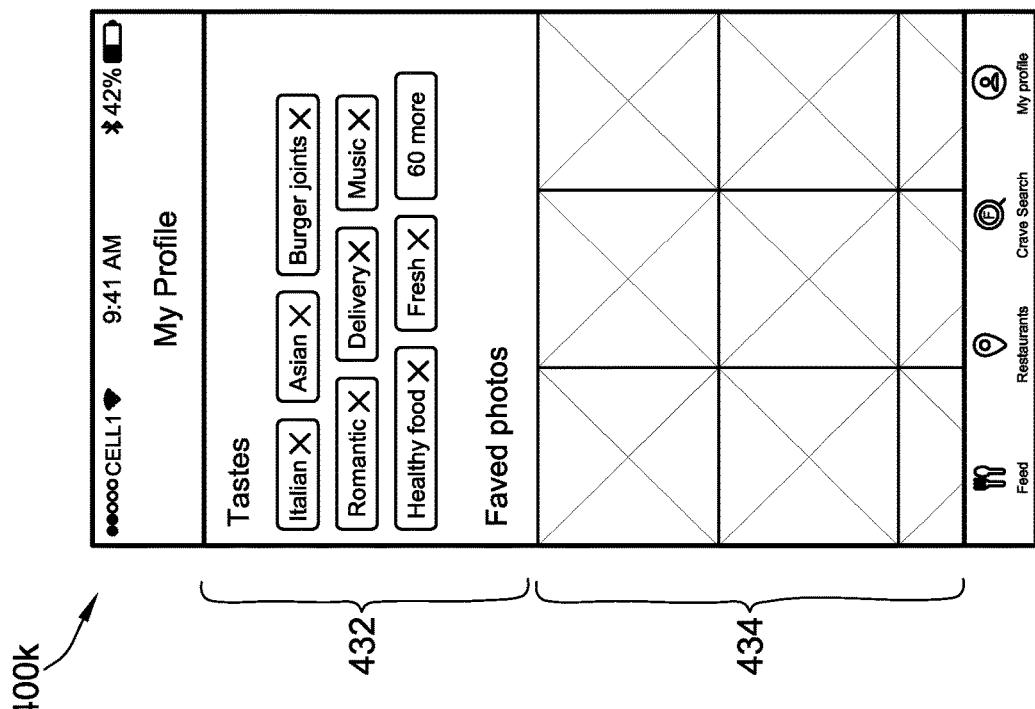


FIG. 4K

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**ITERATIVE IMAGE SEARCH ALGORITHM
INFORMED BY CONTINUOUS
HUMAN-MACHINE INPUT FEEDBACK**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

This application is a continuation of U.S. patent application Ser. No. 15/688,362, filed Aug. 28, 2017, which is a continuation of U.S. patent application Ser. No. 15/070,371, filed Mar. 15, 2016, now U.S. Pat. No. 9,779,160, which is a continuation of U.S. patent application Ser. No. 14/827,205, filed Aug. 14, 2015, now U.S. Pat. No. 9,323,786, issued Apr. 26, 2016, which claims priority to and the benefit of U.S. Provisional Application No. 62/037,788, filed Aug. 15, 2014, all of which are hereby incorporated by reference in their entireties.

FIELD OF THE PRESENT DISCLOSURE

Aspects of the present disclosure relate generally to systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest.

BACKGROUND

There exist a multitude of applications, both Internet-based applications and smartphone/tablet-based applications, that make recommendations for users based on analyzing a user's history. A user's history can include or reflect, for example, choices the user previously made based on the user's preferences. Although a user's preferences can be constant as a whole over a long period of time, the generality of the preferences allow for a user's current specific preference to be less defined. For example, user's preferences with respect to food are fairly constant. A user may prefer, for example, Italian food and Chinese food. A history of the user's food preferences captures this general information and may allow applications to provide a generalized recommendation for what a user may want now or in the future. However, a user's current preferences can be more granular than what can be captured by recommendation systems that rely on analyzing a user's history to make a current recommendation at a specific moment in time when the user may be craving something in particular. Thus, the granularity of a user's current, specific preference also allows for specific current interests than cannot accurately be predicted based on a user's history alone. For example, with respect to food, a user can experience cravings—where a user desires a specific type of food among all of the types of food that the user normally enjoys. Therefore, current applications do not help a user determine what the user's current interest is despite the applications' having access to the user's history. Moreover, although the user may know that he or she wants something, the particular object of the user's interest may be unknown even to the user until one of the user's senses is inspired or provoked. Further, thinking by the user of what the users' current interest is, alone, may not help the user in defining his or her current interest.

According to aspects of the present disclosure, a system and computer-implemented method are disclosed that guide a user to his or her current interest based on a sequential presentation of images representative of possible physical objects of interest.

SUMMARY

An aspect of the present disclosure includes a computer-implemented method of analyzing tags associated with a

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sequence of images presented to a user in response to human-machine inputs made by the user to present a current interest of the user, such as a food craving. The method includes presenting, via a display of an electronic device, one image from among a plurality of images. The one image represents a physical object and is associated with one set of tags from a plurality of tags. Each tag of the one set of tags describes or characterizes attributes of the physical object represented by the one image. The method further includes 10 receiving, via a user interface of the electronic device, an input by the user indicating a preference for the physical object represented by the one image. The method also includes processing, by one or more computer devices, the plurality of tags based on the preference and the one set of tags to determine a next set of tags from the plurality of tags. The method further includes determining, by the one or more computer devices, a next image from the plurality of images associated with the next set of tags. The next image represents a physical object that is different from the physical object represented by the one image, and the next set of tags describes or characterizes attributes of the physical object represented by the next image. The method also includes generating the sequence of images by repeating the presenting, the receiving, the processing, and the determining with the next image in place of the one image during a session of presenting the current interest of the user.

An additional aspects of the present disclosure includes one or more computer-readable, non-transitory, storage media encoding machine-readable instructions that, when 20 executed by one or more computers, cause operations to be carried out. The operations include presenting, via a display of an electronic device, one image from among a plurality of images. The one image represents a physical object and is associated with one set of tags from a plurality of tags. Each 25 tag of the one set of tags describes or characterizes attributes of the physical object represented by the one image. The operations include further include receiving, via a user interface of the electronic device, an input by the user indicating a preference for the physical object represented by the one image. The operations also include processing, by one or more computer devices, the plurality of tags based on the preference and the one set of tags to determine a next set of tags from the plurality of tags. The operations further 30 include determining, by the one or more computer devices, a next image from the plurality of images associated with the next set of tags. The next image represents a physical object that is different from the physical object represented by the one image, and the next set of tags describes or characterizes attributes of the physical object represented by the next image. The operations also include generating the sequence of images by repeating the presenting, the receiving, the processing, and the determining with the next image in place of the one image during a session of presenting the current 35 interest of the user.

Further aspects of the present disclosure include a computer-implemented method of automatically recommending restaurants proximate a user based on a sequence of the user's expressed food preferences. The method includes receiving a geographic location associated with the user, and 40 retrieving, using one or more computer devices, a first set of digital photographs, each depicting a different food, and associated with a plurality of tags indicating a genre of the food featured in the corresponding photograph, a description of the food featured in the corresponding photograph, and a food establishment where the corresponding photograph of the food was taken. The food establishment is located within 45 a predetermined proximity of the geographic location. The

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method further includes displaying, by a display device, the first set of photographs over one or multiple frames on the display device. For each of at least some of the first set of photographs, the method includes receiving via a user input device one of at least two input options, the at least two input options including a favorable indication of a preference for the food featured in the corresponding one of the at least some of the first set of photographs or an unfavorable indication of a disinclination for the food featured in the corresponding one of the at least some of the first set of photographs. The method also includes storing, for each of the at least some of the first set of photographs, in a memory storage device, a record indicating a relationship between the received input option and the tags associated with each corresponding one of the at least some of the first set of photographs, to produce a plurality of records on the memory storage device. The method further includes analyzing, using the computer or another computer, the records to identify a genre of food having at least a probable chance of being liked by the user, and retrieving, using the computer or another computer, a further digital photograph depicting a food, the further digital photograph being associated with a tag indicating a genre of the food featured in the further photograph and having at least a probable correlation with or matching the identified genre. The method also includes using the received geographic location, the computer or another computer identifying at least one food establishment, which is located in a predetermined proximity to the received geographic location and which serves the identified genre of food, and displaying, by the display device, information regarding the at least one identified food establishment.

Additional aspects of the present disclosure will be apparent to those of ordinary skill in the art in view of the detailed description of various embodiments, which is made with reference to the drawings, a brief description of which is provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a functional block diagram of a computer system according to an aspect of the present disclosure.

FIG. 2A is a flowchart of a computer-implemented method or algorithm of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 2B is a flowchart of a computer-implemented method or algorithm of determining from among a pool of tags and a pool images tags and images that are relevant for a user according to aspects of the present disclosure.

FIG. 2C is a flowchart of a computer-implemented method or algorithm of determining and/or updating associations between elements within the system according to aspects of the present disclosure.

FIG. 3 is a diagram of a flow illustrating the processing of a plurality of tags that are relevant to a user according to aspects of the present disclosure.

FIG. 4A illustrates a user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4B illustrates another user interface of a computer-implemented method or process of analyzing tags associated

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with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4C illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4D illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4E illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4F illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4G illustrates another user interface of a computer-implemented method or process of analyzing tags associated with a sequence of images presented to a user to present a current interest of the user according to aspects of the present disclosure.

FIG. 4H illustrates a user interface for uploading an image according to aspects of the present disclosure.

FIG. 4I illustrates another user interface for uploading an image according to aspects of the present disclosure.

FIG. 4J illustrates another user interface for uploading an image according to aspects of the present disclosure.

FIG. 4K illustrates a user interface for visualizing a profile of a user according to aspects of the present disclosure.

FIG. 4L illustrates a user interface for visualizing a profile of a user according to aspects of the present disclosure.

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DETAILED DESCRIPTION

While this disclosure is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail example implementations of the inventions and concepts herein with the understanding that the present disclosure is to be considered as an exemplification of the principles of the inventions and concepts and is not intended to limit the broad aspect of the disclosed implementations to the examples illustrated. For purposes of the present detailed description, the singular includes the plural and vice versa (unless specifically disclaimed); the words "and" and "or" shall be both conjunctive and disjunctive; the word "all" means "any and all"; the word "any" means "any and all"; and the word "including" means "including without limitation."

A (software) module can refer to computer-readable object code that executes a software sub-routine or program, which corresponds to instructions executed by any micro-processor or microprocessing device to perform described functions, acts, or steps. Any of the methods or algorithms or functions described herein can include non-transitory machine or computer-readable instructions for execution by: (a) an electronic processor, (b) an electronic controller, and/or (c) any other suitable electronic processing device.

Any algorithm, software module, software component, software program, routine, sub-routine, or software application, or method disclosed herein can be embodied as a computer

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program product having one or more non-transitory tangible medium or media, such as, for example, a flash memory, a CD-ROM, a floppy disk, a hard drive, a digital versatile disk (DVD), or other electronic memory devices, but persons of ordinary skill in the art will readily appreciate that the entire algorithm and/or parts thereof could alternatively be executed by a device other than an electronic controller and/or embodied in firmware or dedicated hardware in a well-known manner (e.g., it may be implemented by an application specific integrated circuit (ASIC), a programmable logic device (PLD), a field programmable logic device (FPLD), discrete logic, etc.).

As discussed above, there currently exist recommendation systems that are unable to account for a user's current (i.e., contemporaneous) interest or preference based on the breadth of the user's interest, despite, for example, the recommendation systems having access to information regarding the user's history. The granularity of a user's current preference relative to, for example, a user's historical preferences with respect to the subject matter relating to the preference prohibits current recommendation systems from being able to estimate or present the user's current interest at the moment in time the user may be craving something. At best, current recommendation systems merely provide a one-time guess regarding the user's current preference. Moreover, within the realm of food, in particular, current applications exist that provide information regarding broad categories of food that are available within the user's current location. However, the amount of information provided by such applications may amount to information overload. The information overload does not allow a user to determine a specific food dish in which the user is currently interested. What is needed, *inter alia*, is a guided, iterative searching solution that repeatedly and dynamically adjusts searching criteria in response to human-machine inputs made by the user to arrive at a recommendation that will satisfy the user's contemporaneous craving at the conclusion of the search session. In this way, both human and machine are necessary partners in this search strategy. Only the human can, using his or her subjective senses, ascertain from an image how a user feels about what is presented in the image. However, to satisfy an immediate craving, the machine is needed to help the human user arrive at a recommendation quickly, within less than a minute or so. The Internet, cellular data and wireless technology, and smartphones have given users instant access and visibility to a myriad of options, but in some respects, this access and visibility is as much a blessing as it is a curse. With so many choices and options readily available, a new programmed machine is needed to help users find relevant information quickly to satisfy needs that are fleeting and must be satisfied quickly.

Accordingly, aspects of the present disclosure provide for systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The systems and methods allow for the presentation of a sequence of images to the user. Each image represents a physical object that the user can obtain through a physical entity that provides the physical object. In the realm of food, for example, the physical object can represent a food dish and the physical entity can represent a restaurant or store or food establishment (e.g., market, grocery, store, etc.) that offers the food dish. A food dish as used herein includes any edible item or combination of edible items that can be consumed (e.g., eaten or drunk) by animals, including drinks such as bubble tea, milkshakes, or cocktails. Each image within the sequence is associated with a set of tags

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that describe the physical object. Based on a user's preference for each tag, a new image is presented to generate the sequence of images. The new image is selected based on the set of tags associated with the image that describe the physical object represented by the image, and how the set of tags for the new image relate to the set of tags for the previous image based on the preference of the previous image. The sequence of presenting images to the user that represent physical objects continues to guide the user into determining a physical object that satisfies or describes the user's current interest. Once the user is presented with an image that represents a physical (tangible) object that the user is currently interested in (e.g., craving), the systems and methods allow for the user to select the image (e.g., a digital photograph) to be presented information on how to obtain (e.g., consume) items depicted in the physical image. In the realm of food as a human interest, for example, the user can be directed to an Internet web site of a physical entity such as a restaurant or other food establishment that serves or offers food at which the user can purchase the dish of food and optionally consume at the food establishment. According to some embodiments, the user can be directed to an electronic user interface of a software application, independent from the web site of the restaurant, at which the user can purchase the dish of food, to provide additional convenience to the process of obtaining the food dish.

FIG. 1 is a functional block diagram of a system 100 according to an aspect of the present disclosure. First, the general components of the system 100 will be introduced, 30 followed by examples. The system 100 includes one or more electronic computers (clients) 102a, 102b. Reference numbers used herein without a letter can refer to a specific one of the plurality of items, a subset of multiple items of the plurality of items, or all items of the plurality of items so numbered with the same reference number. Thus, by way of example, the reference number 102 can refer to the computer 102a, the computer 102b, or both of the computers 102a and 102b, as shown in FIG. 1. The one or more computers 102a, 102b connect to a communication network 104, such as the 40 Internet. However, the communication network 104 can be any type of electronic communication network. A computer as used herein includes any one or more electronic devices having a central processing unit (CPU) or controller or microprocessor or microcontroller as understood by those skilled in the art of electronic computers. Examples of computers include tablet computers, laptop computers, desktop computers, servers, smartphones, a wearable electronic device such as a watch, an eyeglass, an article of clothing, or a wristband, and personal digital assistants (PDAs). The term computer as used herein can include a system of electronic devices coupled together to form what is conventionally referred to as a computer.

For example, one or more input devices, such as a keyboard or a mouse, and one or more electronic display devices, such as a video display, can be coupled to a housing that houses the CPU or controller. Or, all components of the computer can be integrated into a single housing, such as in the case of a tablet computer or a smartphone. The one or more computers 102a, 102b conventionally include or are 55 operatively coupled to one or more memory devices that store digital information therein, including non-transitory machine-readable instructions and data.

The one or more computers 102a, 102b include user interface devices 110a, 110b. Each user interface device 60 110a, 110b corresponds to a human-machine interface (HMI) that accepts inputs made by a human (e.g., via touch, click, gesture, voice, etc.) and converts those inputs into

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corresponding electronic signals. Non-limiting examples of user interface devices **110a**, **110b** include a touchscreen, a keyboard, a mouse, a camera, and a microphone. These are also referred to as human-machine interface devices, because they allow a human to interact with a machine by providing inputs supplied by the human user to the machine.

The one or more computers **102a**, **102b** also include electronic display devices **112a**, **112b** that are configured to display information that can be visually perceived. Non-limiting examples of display devices **112a**, **112b** include an electronic video display, a stereoscopic display, or any electronic display configured to visually portray information including text, static graphics, and moving animations that is perceivable by the human eye. The electronic display devices **112a**, **112b** display visual information contained in an electronic user interface (UI). The electronic UI can also include selectable elements that are selectable using the one or more HMI devices **110a**, **110b**. Thus, the electronic UI generally can include a graphical user interface (GUI) component and a human-machine user interface component, via which a human user can select selectable elements displayed on the GUI via the HMI interface.

The one or more computers **102a**, **102b** also include software applications **114a**, **114b**. That is, the one or more computers **102a**, **102b** execute non-transitory machine-readable instructions and data that implement the software applications **114a**, **114b**. The applications **114a**, **114b** perform one or more functions on the one or more computers **102a**, **102b**. The applications **114a**, **114b** can be various specific types of applications, such as a web browser application or a native application. Within the system **100**, the applications **114a**, **114b** convey information between the one or more computers **102a**, **102b** and the communication network **104** (e.g., Internet) via a conventional wired or wireless electronic communications interface associated with the one or more computers **102a**, **102b**. Alternatively, or in addition, the applications **114a**, **114b** can be a native application. Native applications convey information between the one or more computers **102a**, **102b** over the communication network **104** to an application server **106**. The native applications **114a**, **114b** conventionally convey information between the one or more computers **102a**, **102b** over the communication network **104** via a conventional wired or wireless electronic communications interface associated with the one or more computers **102a**, **102b**.

As described above, the server **106** is also coupled to the communication network **104**. The server **106** is a type of computer, and has a well understood meaning in the art. The server **106** can be, for example, a web browser server, such as in the case of applications **114a**, **114b** being web browser applications. Or, the server **106** can be, for example, a native application server, such as in the case of applications **114a**, **114b** being native applications.

An electronic database **108** is incorporated in or is coupled to the server **106**. The database **108** is a form of a memory device or a data store, and stores electronic data for retrieval and archival relative to the server **106**. Both the server **106** and the one or more applications **114a**, **114b** communicate information according to one or more protocols, such as the hypertext transfer protocol (HTTP) in the case of the communication network **104** being the Internet. In the case of the communication network **104** being a private local area network (LAN), instead of the Internet, any other communications protocol can be used instead of the HTTP. For example, native applications can instead communicate using a proprietary or conventional commu-

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nications protocol to pass information between the one or more computers **102a**, **102b** and the server **106**.

Although the system **100** is shown generally with respect to FIG. 1 as including two computers **102a**, **102b**, one server **106**, and one database **108**, the system **100** can include any number of computers **102a**, **102b**, any number of independent or clustered servers **106** (e.g., server farm or sever cluster), and any number of databases **108**. Moreover, some or all functionality of one or more components of the system **100** can be transferred, in whole or in part, to other components of the system **100**. By way of example, functionality of the server **106** and/or the database **108** can be transferred, in whole or in part, to the one or more computers **102a**, **102b**, depending on the functionality and performance of the computers **102a**, **102b**.

The applications **114a**, **114b** communicate with the server **106** and the database **108** over the communication network **104** for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The applications **114a**, **114b** control the user interface devices **110a**, **110b** and the display devices **112a**, **112b** to present the images to the user and to receive inputs from the user indicating the user's preferences for the images. The images are communicated over the communication network **104** to the applications **114a**, **114b** of the one or more computers **102a**, **102b** from the database **108**, either directly or through the server **106**. Accordingly, based on a client-server arrangement of the system **100**, with the computers **102a**, **102b** as the clients and the server **106** as the server, the database **108** stores the information used for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. The server **106** performs the functionality of the algorithms described herein, including serving the information from the database **108** to the clients (e.g., computers **102a**, **102b**). The computers **102a**, **102b** present the information to the user and receive the inputs from the users, which are then presented to the server **106** for processing. However, the functionality disclosed herein with respect to the disclosed algorithms can be divided among the components of the system **100** differently than as explicitly disclosed, without departing from the present disclosure. For example, all of the functionality disclosed herein can be embodied in one or more of the computers **102a**, **102b**, such as the computers **102a**, **102b** being arranged as a distributed network, depending on the capability of the computers **102a**, **102b**.

As one facet of the information, the database **108** electronically stores the electronic images within a data store of images. The images can be of various file formats and image types. By way of example, the file formats can include JPEG, Tagged Image File Format (TIFF), Portable Network Graphics (PNG), etc. The image types can include digital photographs, digital drawings, icons, etc. As discussed above, the images stored on the database **108** represent a physical object that may be of interest to the user (e.g., the user may be craving). Accordingly, the images visually convey information to the user so that the user understands the physical objects that the images represent. The system **100** can initially include a set number of images. The set number of the images can be defined by the administrator of the system **100**. As described below, the system **100** also allows for users to add additional images to the system **100**. For example, users can upload images from the one or more computers **102a**, **102b** to add additional images to the database **108**. As the users interact with the system **100**, and the users upload images to the system **100**, the number of images increases. For example, the images can be digital

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photographs of food (including drinks) the users who upload them have ordered or seen at restaurants they have visited.

For each image, the database 108 stores information regarding the physical object that the image represents. The physical object can be any physical (tangible) object that is representable by an image. By way of example, and without limitation, the physical objects can be food dishes, consumer goods, such as clothing, automobiles, etc., physical locations, such as vacation spots, museums, sports venues, etc. For purposes of convenience, the present disclosure is related primarily to food dishes as the physical objects. However, as understood by one of ordinary skill in the art, the disclosure is not limited to physical objects that are only food dishes. Rather, each physical object can be any physical object represented by an image such that a user can identify the physical object when presented the image.

The database 108 also stores electronic tags. Primary tags are used within the system 100 to describe and/or characterize the physical object that is represented by an image. The primary tags can include single words or several words linked together as a tag that describe or characterize the physical object overall, or that describe or characterize sub-components or sub-aspects (e.g., attributes) of the physical object. Accordingly, for each image, the image is associated with a set of tags that describe or characterize the physical object. The database 108 stores all of the tags within a pool of tags, which is the totality of tags that can be associated with an image to describe a characteristic and/or a quality of the physical object that is represented by the image. The primary tags can be any type of descriptor of the physical object represented by the image. With respect to the physical objects being food dishes, the tags can describe general aspects of the food dishes, such as, for example, an ethnicity or a cuisine of the food dish, such as African, American, Argentinian, etc., which meal of the day the food dish generally applies to, such as breakfast, brunch, lunch, dinner, supper, snack, dessert, late-night, etc. The tags can also be adjectives that describe the food dishes, such as, for example, cheesy, crunchy, hot, cold, spicy, etc. The tags can also identify the food or ingredients generally that constitute the food dish, such as, for example, vegetables, meats, fruits, breads, etc. The tags can also identify the food or ingredients more specifically that constitute the food dish, such as, for example, identifying the specific fruit, such as apples, apricots, etc., the specific meat, such as beef, poultry, fish, pork, etc., the specific vegetable, such as broccoli, asparagus, lettuce, carrots, etc. The tags can also identify the specific food dish as a whole, such as, for example, spaghetti with vodka sauce, fettuccine stroganoff, leg of lamb, etc., or constituent sub-dishes (e.g., "sides") within the food dish, such as, for example, sausage, eggs, pancakes, French toast, etc., that are all within the food dish of a large breakfast with various constituents.

The tags can be objective, subjective (or semi-subjective), or tangential regarding how the tags describe or characterize the physical object that is associated with the image. The examples of primary tags provided above are objective tags that directly describe the physical objects. The tags may additionally include tags that are at least partially subjective and/or tangentially describe the physical objects. With respect to food dishes as the physical objects for purposes of example, subjective or semi-subjective tags may include, for example, tasty, mouth-watering, delicious, healthy, hearty, etc. Such subjective or semi-subjective tags may apply to the food dish for one user but not necessarily all users. Tangential tags may describe aspects of the physical object only when correlated with other information. Such other infor-

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mation may only be known or apply to a subset of users that interact with the system 100. By way of example, such tags may be terms currently trending in social media, such as hashtags on TWITTER® that apply to only a subgroup of users that are following the current social media trends. Such tags include, for example, hipster, yolo, GenY, GenX, etc. Independent of the context of the tag, these tangential tags do not necessarily apply to a physical object. However, patterns may develop that allow certain tangential tags to be understood as referring to a quality or characteristic of a physical object.

Like the images, the system 100 initially begins with a certain number of tags. However, the group of tags can be dynamic and evolve as the users interact with the system 100. For example, additional tags can be added to the pool of tags as users upload new images of physical objects to the system 100 and describe the physical objects based on new tags that the users create. The users can create additional tags to describe or characterize the physical object that is associated with the image that the users uploaded. Each image is associated with one or more of the tags from among the group of tags as a set of tags for the image. The association can be based on an administrator of the system 100 associating the tags with the images. Alternatively, or in addition, the association can be based on users of the system 100 associating the tags with the images and/or creating new tags. The association based on the users can be manual, such as the users manually selecting a tag to associate with an image. Alternatively, or in addition, the association can be automatic, such as the system 100 automatically determining tags that apply to images. Based on the images being associated with multiple tags as a set of tags, the database 108 also stores information pertaining to specific sets of tags. A specific combination of tags is a set of tags. A single set of tags can describe multiple different images based on the generality of each tag and an image being associated with any number of tags. The database 108 may include a data structure, such as a table, to track the various sets of tags based on the various associations between tags and images within the database 108.

The database 108 also stores and tracks associations between elements of the system 100, such as between tags, between sets of tags, between images and tags and/or sets of tags, between users and the elements, etc. The system 100 can associate a tag with an image based on the image already being associated with another tag, and both of the tags including an association. By way of example with respect to food dishes as physical objects, an image may represent a Chinese food dish that includes rice. The image may already be associated with the tag Chinese but not be associated with the tag rice. Based on an association developed by the system 100 tracking usage of the tag "Chinese" with the tag "rice," in addition to, for example, other users liking other images that are tagged with both the tag "Chinese" and the tag "rice," the system 100 can automatically determine to associate the tag rice with the image based on the image being associated with the tag Chinese. The association can develop as the number of images that represent different physical objects increases within the database 108, or as more users interact with the tags and with the images. For example, as more users upload images to the system 100, the users may associate both of the tags Chinese and rice to the newly uploaded images. The system 100 tracks the continued association of the tag Chinese with the tag rice and logs the association within the database 108.

The tags may be divided into two overall categories, such as primary tags and secondary tags. Primary tags are defined

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by an administrator of the system **100**. The primary tags include tags that directly describe or characterize the physical object. The system **100** at least initially includes primary tags. The system **100** can also initially include secondary tags. The secondary tags are defined by the administrator of the system **100** and/or by users of the system **100**. The secondary tags may identify the same characteristic and/or quality as the primary tags, or the secondary tags may identify different characteristics and/or qualities as the primary tags. Secondary tags may directly describe or characterize the physical object, such as with primary tags. In addition, secondary tags may subjectively describe or characterize the physical objects, or may tangentially describe or characterize the physical objects as described above.

Each image is associated with at least one primary tag, but can be associated with any number of primary tags and secondary tags. Some images may be associated with only one primary tag. For example, an image may represent the physical object bread and the only tag associated with the image may be the tag bread. Some images may be associated with many different tags, such as an image that represents the physical object of French toast, which can include the tags bread, breakfast, egg, sweet, etc.

The systems and methods of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest relies on a plurality of tags that is associated with a user being processed based on a previous set of tags of an image and a preference for that image from the user. Accordingly, the database **108** may store, or the server **106** may dynamically generate, a plurality of tags that are a subset of all of the tags (e.g., pool of tags) that are stored on the database **108**. The plurality of tags includes not only the tags but also the sets of tags that correspond to the images that are covered by one or more of the tags. As will be described in greater detail below, the plurality of tags may be tags that apply or are relevant to a user, such as tags within the pool of tags that match tags associated with a user's profile. As the user is presented with images and provides preferences in response to the images, the plurality of tags evolves as certain tags are removed (or not considered) and/or certain sets of tags are removed (or not considered) from the plurality of tags.

The database **108** also stores user profiles. Generally, the user profiles include information that is used for the interacting with the system **100**. Such information can include certain tags indicated by the user to include with the user's profile, images, physical objects, and/or entities for which the user has indicated a positive or a negative preference, independent of or dependent of the user interacting with images presented to the user during a session of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. With respect to food dishes for the physical objects, the information can include tags and images that apply to food dishes that the user prefers (e.g., likes), and food dishes that the user does not prefer (e.g., dislikes). The user can indicate such preferences through a manual selection of the tags. Alternatively, or in addition, such preferences can be learned by the system **100** during the user's interaction with the system **100** over a period of time, such as through an implicit selection of the tags as preferred tags through the user indicating over time a preference for the tags. The preference can be indicated according to a YES/NO schema, such as the user does or does not like a tag, an image, and/or a physical object. Alternatively, the preference can be indicated according to a weighted schema, such as a degree to which the user does or does not like a tag, image, and/or physical object. The profile

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information can include any other additional information associated with a user, such as the user's name, address, gender, age, ethnicity, religion, etc. The system **100** tracks such additional information to mine trends across the users for tags, images, and/or physical objects. For example, the system **100** tracks user's interactions within the system **100** to develop a user history. The user history tracks interactions between the user and the system **100** and allows the user to review the previous interactions. By way of example, the user history can include information pertaining to the user's preference to specific images that were previously presented to the user.

According to some embodiments, and with respect to food dishes as the physical objects specifically, the user profiles can include dietary restrictions, such as, for example, gluten-free, vegan, vegetarian, religious observations (e.g., no pork or shellfish, or Kosher/Halal only), nut allergies, etc. The database **108** can include dietary information to automatically translate the entered dietary restrictions into negative preferences for certain tags, images, and/or physical objects to which the dietary restrictions apply so that restricted food dishes are not presented to the user. The dietary information can be linked to the user's profile so that the user can view the dietary information used by the system **100**.

As discussed above, the physical objects represent objects that are offered by various entities. The database **108** includes information with respect to the location of the entity associated with the physical object and/or the image that represents the physical object. By way of example, the physical object can represent a food dish and the physical entity represents the restaurant or store (e.g., market, grocery store, etc.) that offers the food dish. The database **108** includes information with respect to the location of the restaurant or store. In addition to the location, the database **108** can also include entity profiles. According to some embodiments, the entity profiles can be organized according to a subscription-based system. Entities that are subscribed to the system **100** can include specific information within their profiles that entities who are not subscribed cannot. With respect to food dishes, such information can include food dishes offered by the entity, such as images of food dishes that the entities created and uploaded into the system **100**, in addition to the menu, any current specials/promotions/discounts offered, etc. According to some embodiments, user interactions with the system **100** will allow for the users to confirm the information presented in the entity profiles. The entity profiles can also include images to showcase the entity's physical objects, additional links leading to their websites or social media applications (e.g., FACEBOOK®, TWITTER®), etc.

The entity profiles allow users to browse the entities and click on a suggested or profiled entity, leading the user to the entity's profile. As part of the above-described associations, the system **100** collects and shares visitor frequency with entities when users are redirected to the entities' websites following selection of images associated with physical objects that are associated with the entities. According to some embodiments, the entity profiles will include a direct purchasing interface for users, thereby obviating the need for users to seek third party companies to order or consume physical objects associated with the entity.

FIG. 2A is a flowchart of a computer-implemented method or algorithm **200a** of analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest, using aspects of the present disclosure including the one or more computers **102a**, **102b**, the server

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106, and the database 108. The computer-implemented method or algorithm 200a may be executed within a computer 102a, the server 106, the database 108, or across multiple platforms, such as on the computer 102a and the server 106. In regard of the latter arrangement, an application 114a executed by the computer 102a (e.g., client-side application) may perform the computer-implemented method or algorithm 200a in conjunction with an application executed on the server 106 (e.g., server-side application) according to a client-server relationship. The computer-implemented method or algorithm 200a begins with a user initiating a session of the computer-implemented method or algorithm 200a. As will be described in greater detail below, the session of the computer-implemented method or algorithm 200a begins with determining a plurality of tags that are associated with the user and that will be processed to determine subsequent images to present to the user to generate a sequence of images during a session of the computer-implemented method or algorithm 200a. The plurality of tags also determines the plurality of images from which the images that are presented to the user are selected from. Thus, according to some embodiments, the computer-implemented method or algorithm 200a processes only a subset of the tags and the images stored in the database 108 based on the user that initiated the session of the computer-implemented method or algorithm 200a. The computer-implemented method or algorithm 200a begins with one of the images from among the plurality of images being presented to the user, such as through the display device 112a of the computer 102a (202). As described above, the image represents a physical object and is associated with a set of tags. Each of tag of the set of tag describes the physical object that is represented by the presented image. Thus, the user is presented with an image, and the user is able to recognize the physical object represented by the image.

As will be also described below, along with the image, one or more user interface elements or objects can be optionally presented on the display device 112a of the computer 102a to allow the user to indicate a preference or inclination/disinclination for the physical object that is represented by the image. The user interface elements may vary depending on the functionality/capability of the computer device 102a, the user interface device 110a, and/or the display device 112a. Alternatively, the display device 112a may not present graphical user interface elements (although it could) specifically for the user indicating the preference for the physical object. Rather or additionally, for example, it may be implicit what action the user should take to indicate the preference, such as by swiping left on or near the image or anywhere on the display device 112a to indicate a negative preference (e.g., dislike) and swiping right on or near the image or anywhere on the display device 112a to indicate a positive preference (e.g., like), or vice versa. To be clear, the present disclosure also contemplates displaying graphical UI elements (e.g., like and dislike virtual buttons displayed on the display device 112 for selection using a user interface device 110), and recognizing gestures (e.g., swiping) made by a user relative to a user interface device 110, or one or the other.

Upon the image being presented (e.g., displayed on the display device 112) to the user, the computer-implemented method or algorithm 200a receives an input from the user indicating a preference for the physical object represented by the image (204). The preference may be like or an inclination toward the object (e.g., positive) or dislike or disinclination against the object (e.g., negative). Alternatively, the preference may be like (e.g., positive), dislike

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(e.g., negative), or neither like nor dislike (e.g., neutral). A neutral preference may indicate that the user cannot tell whether he or she likes or dislikes the physical object represented by the image. Alternatively, the preference may be scaled, such as a range of 1 to 10 to indicate the degree that the user likes (e.g., 6 to 10) or dislikes (e.g., 1 to 5) the physical object represented by the image.

The computer-implemented method or algorithm 200a then processes the plurality of tags based on the preference indicated by the user (206). Processing of tags refers to the manipulation or treatment of the tags drawn from the pool of tags by the computer 102 or server 106 during a session. The plurality of tags that is processed is the tags that are selected from the pool of tags stored within the database 108. The processing includes determining a next set of tags based on the preference the user provided in response to the previous image, and the set of tags that are associated with the previous image. Based on the preference, the set of tags from the previous image determine how the plurality of tags is processed to determine the next set of tags. By way of example, if the preference that the user indicated to a previous image is positive, negative, or neutral, the plurality of tags are processed (e.g., treated) differently based on the set of tags of the previous image. In response to the preference for the physical object represented by the previous image being negative, the processing of the plurality of tags includes removing tags from the plurality of tags that correspond to the tags from the set of tags of the previous image. The tags are removed from the plurality of tags that are processed to determine the next set of tags at each iteration of the computer-implemented method or algorithm 200a, for the remainder of the session, so that an image is not presented to the user for the remainder of the session that includes the particular tags. Although the tags are described throughout as being removed from the plurality of tags, removal includes removing the tags from the plurality of tags and also includes leaving the tags within the plurality of tags but not considering the tags. For example, the tags can remain within the plurality of tags but the tags can be marked as, for example, removed such that the tags are not considered during the processing of the plurality of tags.

As discussed above, the tags can be categorized generally as primary tags and secondary tags. An image can be associated with both primary tags and secondary tags. According to some embodiments, the tags that are associated with an image and that are removed from the plurality of tags in response to a negative preference are only the primary tags from the set of tags associated with the image that received a negative preference. Alternatively, both the primary tags and the secondary tags from the set of tags associated with an image that received a negative preference are removed from the plurality of tags in response to a negative preference. Alternatively, whether only primary tags or both primary tags and secondary tags are removed from the plurality of tags may be determined based on the number that have been presented to the user. For example, if the image is one of the first N images presented to the user, where N is 3, 4, or 5, only the primary tags associated with the image are removed from the plurality of tags in response to an input by the user indicating a negative preference. However, if the image is a later image presented to the user, such as the sixth, seventh, or eighth image, both the primary tags and the secondary tags that are associated with the image are removed from the plurality of tags. For subsequent images that are presented to a user after the user has indicated a positive preference to at least one previous image, only those tags that are associated with the newly

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presented image and that are new relative to the previously presented set of tags are the tags that are removed from the plurality of tags, whether they are only primary tags or both primary and secondary tags.

In addition to removing tags (e.g., negative tags) that are associated with an image that the user provides a negative preference for, the computer-implemented method or algorithm 200a may also remove tags that are associated with the negative tags from the plurality of tags (e.g., associated tags). As discussed above, in addition to the tags being stored in the database 108, the database also stores associations between tags. For example, certain tags may be associated with other tags based on trends in the physical objects represented by the images, such as the tag labeled "Chinese" being more associated with the tag labeled "rice" than the tag labeled "burger." Accordingly, in response to a negative preference, the computer-implemented method or algorithm 200a may determine associated tags that satisfy a threshold association with the negative tags. The threshold for the association may be based on any number of factors or metrics, such as the number of times two tags are associated with the same image, the number of times a user indicates a certain preference (e.g., like or dislike) for an image, and the tags that are associated with the image, etc. For example, the association may be based on the number of times two tags are associated with an image when the image is indicated by a user as having a positive preference. However, the threshold for determining the association may vary without departing from the spirit and scope of the present disclosure.

In response to the preference for the physical object represented by the image being positive or favorable, the processing of the plurality of tags includes determining additional tags to add to the tags from the set of tags associated with the image. The additional tags further narrow down the current interest of the user by building upon the tags associated with the previous image, for which the user provided a positive preference.

To determine the one or more additional tags, the computer-implemented method or algorithm 200a processes the plurality of tags to determine the tags that have an association with the positive tags. By way of example, if the tags associated with the previous image include the tags meat and lunch, the computer-implemented method or algorithm 200a processes the plurality of tags to determine tags that are associated with meat and bun, such as the tags hamburger or hot dog rather than, for example, the tag cereal. Similar to above, the threshold for the association may be based on any number of factors or metrics, such as the number of times two tags are associated with the same image, the number of times a user indicates a certain preference (like or dislike) for an image, and the tags that are associated with the image, etc. However, the threshold for determining the association may vary without departing from the spirit and scope of the present disclosure.

Upon determining tags that satisfy a threshold association with one or more tags from the set of tags that are associated with an image that the user indicated a positive preference for, the computer-implemented method or algorithm 200a determines a next set of tags based on the next set of tags including at least one tag of the tags having the threshold association. Thus, if several tags are determined as having a threshold association with one or more tags that are associated with an image that the user indicated a positive preference for, one or more of those tags are selected and the next set of tags includes the one or more tags of those tags and the previous tags of the previous image. If more than one tag exists that satisfies the threshold association with a tag

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from the previous set of tags, the selection of which of the one or more tags to add to generate the next set of tags can vary. The selection can be random, such that, for example, one or more tags from a total of four tags are selected to be included in the next set of tags. Alternatively, the selection can be based on a weighting of the tags. The weighting can be determined based on one or more factors and/or metrics. According to one metric, the weighting can be based on which tag has the highest association with one tag, more than one tag, or all of the tags of the set of tags associated with the previous image that the user indicated a positive preference for. The association can be relative to all tags within the group or pool of tags, all tags that are relevant to the particular user (e.g., that the user indicated a preference for), or all tags within the same category of tags, such as meal, type of food, etc. However, the weighting can be based on any type of metric or schema, such as based on a profile of the user, physical objects associated with the tags having a threshold association, locations corresponding to the physical objects associated with the tags having a threshold association, entities corresponding to the physical objects associated with the tags having a threshold association, or a combination thereof. Once the weighting of the tags is determined, the one or more tags that are added to the set of tags associated with the previous image are selected such that the selected tags are the tags with the highest weighting.

As discussed above, the tags can be categorized generally as primary tags and secondary tags. An image can be associated with both primary tags and secondary tags. According to some embodiments, only tags within the plurality of tags that are primary tags are processed to determine additional primary tag(s) to add to the previous set of tags. Alternatively, all tags within the plurality of tags (e.g., primary and secondary) are processed to determine the additional tags to be added to the previous set of tags. Whether only primary tags are both primary tags and secondary tags are processed to determine additional tags to add to the set of tags associated with the previous image can be determined based on the number of images within a sequence that already have been presented to a user. For example, if the image is one of the first N images presented to the user, where N is 2, 3, 4, or 5, only the primary tags within the plurality of tags are processed to determine an additional tag to add to the previous set of tags. However, if the image is a later image presented to the user, such as the sixth, seventh, or eighth image within a session, both primary tags and secondary tags are processed to determine additional tags to add to the previous set of tags.

As discussed above, the preference that a user can indicate in response to being presented an image representing an object can be a positive preference or a negative preference. Additionally, the preference can be a neutral preference. In response to the preference indicated for an image being a neutral preference, the set of tags (e.g., combination of tags) that are associated with the image are logged and no set of tags (e.g., combination of tags) that include only that set of tags is subsequently presented to the user for the remainder of the session. Therefore, no image that is associated with a set of tags that includes only that set is presented to the user for the remainder of the session. Alternatively, in response to the preference being a neutral preference, the set of tags that are associated with the image are logged and no set of tags that include that set of tags, in addition to any other tags, is subsequently presented to the user for the remainder of the session. Accordingly, in response to a neutral preference, the computer-implemented method or algorithm 200a processes the plurality of tags and determines the next set of tags based

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on the next set of tags not including the one set of tags corresponding to the image, either alone or, alternatively, in any combination with additional tags, for a remainder of the session. Thus, sets of tags are logged that are associated with a neutral preference to narrow the possible next sets of tags and, therefore, images, that can be presented to the user.

In addition, according to some embodiments, and similar to the discussion above with respect to a negative preference, the sets of tags that can be excluded from the possible next set of tags can include sets of tags that include tags that satisfy a threshold association with one or more tags within the set of tags associated with a neutral preference.

Upon determining the set of tags based on the preference and the set of tags for the previous image, the computer-implemented method or algorithm 200a determines the next image to present to the user (208). The next image is an image from a plurality of images that is associated with the next set of tags. Multiple images can be associated with the same set of tags. Accordingly, the computer-implemented method or algorithm 200a selects a single image from the images that share the same set of tags. The criteria of the selection of the image can vary. The selection can be random, such that a random image is selected from the images that share the same set of tags. Alternatively, the selection may be based on a process or metric. As discussed above, the database 108 stores information pertaining to how many times the user has interacted with a specific tag and/or a specific image. The process or metric can include analyzing the number of interactions between the user and the images that share the same set of tags and selecting the image that has the highest number of interactions. The image with the highest number of interactions may offer a high likelihood that the user has a current interest in the physical object represented by the image. Alternatively, the process can include selecting the image that has the lowest number of interactions with the user. The interactions can include any interaction, such as any time the user was presented the image and regardless of the preference the user provided in response to the image. Alternatively, the interactions can be limited to only interactions where the user provided a specific preference, such as a positive preference, a negative preference, or a neutral preference. Alternatively, the process or metric may be based on the entity that is associated with the physical object that is represented by the image. Images that are associated with entities that have subscribed to the system 100 may be weighted higher than images that are associated with entities that have not subscribed to the system 100. Thus, an image may be presented to a user, among multiple images that are associated with the same set of tags, if the image is associated with a subscribing entity.

The computer-implemented method or algorithm 200a generates a sequence of images based on repeating the above process of at least presenting the image to the user and awaiting an input from the user regarding whether the user has a positive or negative, or neutral, preference for the physical object represented by the next image (210). The session of the computer-implemented method or algorithm 200a continues each time the user provides a preference for the currently presented image, and determines the next set of tags and the next image to present based on the preference for the previous image and the set of tags associated with the previous image. The user providing the preferences narrows down the physical object that the user is currently interested in based on the set of tags associated with the images presented to the user that represent the various possible physical objects. The computer-implemented method or algorithm 200a continues within a session as long as the user

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continues to provide inputs corresponding to the user's preferences to physical objects represented by images. Thus, according to some embodiments, the computer-implemented method or algorithm 200a continues indefinitely or at least until the number of images and/or tags are exhausted during the session based on the processing discussed above. During the session, tags and sets of tags are removed based on negative or neutral responses, as described above. Thus, a session can end in the event that there are no more tags and/or images to present to a user. Alternatively, a single session of presenting a sequence of images can last until a predetermined number of images have been presented or displayed to the user or until a predetermined number of inputs have been received from the user. For example, a session of presenting images can last for 10 images. If the user has not yet determined a physical object that the user is currently interested in after the 10th image, the session ends, and the computer-implemented method or algorithm 200a restarts a new session. Restarting a new session of the computer-implemented method or algorithm 200a resets the removed tags, the sets of tags that were neutralized, or both from the previous session. For example, all of the plurality of tags and sets of tags that were initially available at the beginning of the computer-implemented method or algorithm 200a are again available from which to determine new sets of tags and new images to present to the user. Alternatively, the session of the computer-implemented method or algorithm 200a ends once the user selects an image that represents a physical object that the user is interested in, as described in more detail below.

FIG. 2B is a flowchart of a computer-implemented method or algorithm 200b of determining, from among the entire pool of tags and the entire pool images, the plurality of tags and the plurality of images that are relevant for the user for a particular session and that are processed and analyzed for determining images to present to the user, using aspects of the present disclosure including the computer 102a, the server 106, and the database 108. The computer-implemented method or algorithm 200b can be a separate algorithm for purpose of implementation within the system 100 than the computer-implemented method or algorithm 200a. Alternatively, the computer-implemented method or algorithm 200b can be an extension or sub-routine of the computer-implemented method or algorithm 200a.

The computer-implemented method or algorithm 200b selects the plurality of tags that are processed for determining the next set of tags, discussed above in the computer-implemented method or algorithm 200a, and from which an initial image is presented, from among the pool of tags within the database 108 (212). The plurality of tags is selected based on the plurality of tags matching one or more tags associated with a profile of the user. Thus, tags that are relevant to a user, according to the tags matching tags that are within the user's profile, are selected to be within the plurality of tags that are processed as discussed above in the computer-implemented method or algorithm 200a. The tags that are selected are tags that have an exact match with tags within a user's profile. Alternatively, the tags that are selected are tags that have an exact match or that satisfy a threshold association with tags within the user's profile. The association can be based on any association described herein, such as the tags typically being associated with the same image based on trends of images and tags within the database 108. The tags that are selected from among the pool of tags can be only primary tags, or the tags can be both primary tags and secondary tags. In some examples, primary

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and secondary tags have an equal weight, but in other examples, a primary tag can have a higher weight compared to a secondary tag.

The computer-implemented method or algorithm 200b also determines a location associated with the user, the computer 102a that is executing the application to perform the computer-implemented method or algorithm 200b, or a combination thereof (214). The location associated with the computer 102a can be determined automatically based on various functionality of the computer 102a, such as a GPS (global positioning system) receiver within the computer 102a. Alternatively, the location associated with the user and the computer 102a can be determined based on the user manually entering a location within the computer 102a. The location manually entered by the user can be a current location or a different location, such as a location that a user plans on being at during a certain time.

Based on the plurality of tags that are selected from the pool of tags, and the location of the user and/or the computer 102a, the computer-implemented method or algorithm 200b selects images from among the pool of images (216). The images are selected based on the images being associated with at least one tag of the plurality of tags that are selected from the pool of tags. Further, the images are selected based on each image being associated with the location of the user and/or the computer 102a. The images are selected based on the location because, as discussed above, the location corresponds to the location of availability of the physical object that is represented by the image. Based on the computer-implemented method or algorithm 200b, the processing of the tags and the selection of the images within the computer-implemented method or algorithm 200a is limited to the tags that are relevant to the user and to the images that represent physical objects that are local to a specific location (e.g., current geographic location of user and/or computer 102a, or planned/expected location of the user and/or computer 102a).

The first image presented during a session of the computer-implemented method or algorithm 200a is an image within the pool of images. By way of example, the first image is randomly selected from among the plurality of images as a first image of the sequence of images. Alternatively, the first image can be an image from among the plurality of images that is associated with a high number of interactions with the user, either through direct interactions between the user and the image, such as the user indicating a preference in response to being presented an image, or through interactions between one or more tags associated with the image and the user. Alternatively, the first image presented to the user within a session of the computer-implemented method or algorithm 200a can be based on a search of the user for a specific tag, physical object, or entity that provides the physical object. For example with respect to food, the user can elect to begin a session of the computer-implemented method or algorithm 200a and enter the name of the physical object they seek, such as Chinese chicken salad. In response, the computer-implemented method or algorithm 200a searches for images within the database 108 containing one or more tags describing or characterizing Chinese chicken salad, enabling the user to search their geographic area for restaurants/vendors bearing that food item. At the same time, this functionality encourages restaurants (e.g., entities) associated with premium accounts to upload images of their food dishes, thereby making their food dishes searchable within the system 100 for all potential users within their local area.

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FIG. 2C is a flowchart of a computer-implemented method or algorithm 200c of determining and/or updating associations between elements within the system 100, using aspects of the present disclosure including the computer 102a, the server 106, and the database 108. The computer-implemented method or algorithm 200c can be a separate algorithm for purpose of implementation within the system 100 than the computer-implemented method or algorithm 200a and 200b. Alternatively, the computer-implemented method or algorithm 200c can be an extension or a subroutine of the computer-implemented method or algorithm 200a. During a session of generating a sequence of images by the computer-implemented method or algorithm 200a, the computer-implemented method or algorithm 200c logs the inputs from the user as interactions (218). The inputs are logged as interactions with the tags, the sets of tags, the images, the physical objects, and/or the entities associated with the physical objects for which the inputs apply. When a user provides an input of a preference associated with an image, the input is logged as applying to the image, the physical object represented by the image, one or more tags associated with the image, and/or the entity associated with the physical object. The input can be logged relative to only the user, or the input can be logged across all users.

The logging of the inputs allows the computer-implemented method or algorithm 200c to modify associations between the various informational elements within the system 100 (220). For example, the logging allows the computer-implemented method or algorithm 200c to modify associations tags, between sets of tags, and/or between an image and a tag and/or a set of tags based on the interactions. The associations can be modified relative to the user making the inputs, or the associations can be applied to all users. Accordingly, the associations discussed and used with the computer-implemented method or algorithms 200a and 200b are dynamic and constantly evolving based on the continued user inputs.

FIG. 3 is a diagram of a flow 300 illustrating the processing of a plurality of tags that are relevant to a user over the course of a session of the computer-implemented method or algorithm 200a. The flow begins with a set of tags 302. The set of tags 302 is associated with an image that is presented to the user at the computer 102a through execution of the application 114a. Specifically, the display device 112a displays the image that is associated with the set of tags 302. As shown, the set of tags 302 includes primary tags 302a and secondary tags 302b. The tags can be any of the above-described tags; however, for purposes of convenience, the tags are represented by alphabetical characters. Thus, the primary tags 302a of the tag 302 include the tags A, B, and C, and the secondary tags 302b of the tag 302 include the tags D and E.

In response to the presentation of the image associated with the set of tags 302, the user indicates, for example, a preference for the physical object represented by the image. As described above, the preference may be indicated through the user interface device 110a. For purposes of explanation, the preference is represented by the arrow 314a in FIG. 3. Specifically, the arrow 314a represents a preference for the image associated with the set of tags 302 that is negative.

Based on the negative preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 304 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that

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is associated with the set of tags 304. The set of tags 304 includes the primary tags 304a F, G, and H, and the secondary tags 304b I and J. Because the user provided a negative preference in response to the physical object represented by the image that was associated with the set of tags 302, the set of tags 304 does not include any of the primary tags 302a. Specifically, the primary tags 302a of A, B, and C were removed from the plurality of tags that are processed to determine the next set of tags for the remainder of the session of the computer-implemented method or algorithm 200a.

Similar to above, in response to the presentation of the image associated with the set of tags 304, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow 316a in FIG. 3. Specifically, the arrow 316a represents a preference for the image associated with the set of tags 304 that is positive.

Based on the positive preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 306 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the set of tags 306. The set of tags 306 includes the primary tags 306a F, G, H, and K, which are the primary tags 304a and the additional primary tag K. That is, the computer-implemented method or algorithm 200a builds upon the set of tags 304 based on the positive preference of the user by determining a set of tags that includes the previous primary tags and an additional primary tag (or more), and the corresponding image that the set of tags is associated with.

The set of tags 306 also includes the secondary tags 306b D, E, and I. Despite the user indicating a negative preference for the set of tags 302, which included the secondary tag D, the secondary tag D can be used again in a subsequent set of tags because the tag is a secondary tag. Alternatively, the secondary tags may also be removed from the plurality of tags that are processed, for the remainder of the session, to determine a next set of tags, instead of only the primary tags.

In response to the presentation of the image associated with the set of tags 306, the user indicates a preference for the physical object represented by the image. For ease of explanation, the preference is represented by the arrow 314b in FIG. 3. Specifically, the arrow 314b represents a preference for the image associated with the set of tags 306 that is negative.

Based on the negative preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 308 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the set of tags 308. The set of tags 308 includes the primary tags 308a F, G, H, and L, and the secondary tags 308b M, N, and O. Because the user provided a negative preference in response to the physical object represented by the image that was associated with the set of tags 306, the set of tags 308 does not include the primary tag that was added between the set of tags 304 (e.g., last positive preference) and the set of tags 306, i.e., primary tag K. That is, the negative preference in response to the set of tags 306 is attributed to the addition of the primary tag K; thus, the primary tag K is removed from the plurality of tags for the

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remainder of the session such that no subsequent set of tags can include the primary tag K. The set of tags 308 also includes the secondary tags 308b M, N, and O.

In response to the presentation of the image associated with the set of tags 308, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow 318a in FIG. 3. Specifically, the arrow 318a represents a preference for the image associated with the set of tags 308 that is neutral.

Based on the neutral preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 310 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the next set of tags 310. The set of tags 310 includes the primary tags 310a F, G, H, and P, and the secondary tags 310b D, E, and O. Because the user provided a neutral preference in response to the physical object represented by the image that was associated with the set of tags 308, the set of tags 310 does not include the primary tag that was added between the set of tags 306 (e.g., last positive preference) and the set of tags 308, i.e., primary tag L. That is, the neutral preference in response to the set of tags 308 is attributed to the entire set of primary tags 308a, including the primary tag K and the primary tags F, G, and H. Thus, the set of primary tags 308a is removed from the plurality of tags that are processed, in the sense that the exact same set of primary tags 308a can never be presented to the user again. However, the primary tag L is not removed from the plurality of tags for the remainder of the session such that subsequent sets of tags can include the primary tag L, as long as the set of tags is not the exact set of primary tag 308a. The set of tags 310 also includes the secondary tags 310b D, E, and O.

In response to the presentation of the image associated with the set of tags 310, the user indicates a preference for the physical object represented by the image. For purposes of explanation, the preference is represented by the arrow 316b in FIG. 3. Specifically, the arrow 316b represents a preference for the image associated with the set of tags 310 that is positive.

Based on the positive preference, the computer-implemented method or algorithm 200a processes the plurality of tags to determine a next set of tags and a next image that is associated with the next set of tags. The set of tags 312 represents the next set of tags determined by the computer-implemented method or algorithm 200a, and an image that is associated with the set of tags 312. Because the user indicated a positive preference to the previous physical object represented by the image associated with the set of tags 310, the set of tags 312 includes the primary tags 312a F, G, H, P, Q, and R, which are the primary tags 310a and the additional primary tags Q and R. That is, as described above, the computer-implemented method or algorithm 200a builds upon the positive preference of the user by determining a set of tags that includes the previous primary tags and one or more additional primary tags, and the corresponding image that the set of tag is associated with.

The flow 300 continues until the user selects a physical object that is represented by a currently presented image, which corresponds to the last image that is presented within the above sequence of images, is a physical object that the user would like to obtain. Alternatively, the flow 300 continues until the session is ended and restarted, for the reasons discussed above. In each case, when a session of the

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computer-implemented method or algorithm 200a is started or restarted, the plurality of tags and images that are processed are reset such that the tags and sets of tags that were removed from the plurality of tags are inserted back into the plurality of tags for processing.

The following figures use any of the aspects described above in connection with the foregoing FIGS. 1-3. These figures and accompanying description lay out some of the foundational aspects of the present disclosure, which the following figures show as mere exemplars of the many implementations contemplated by the present disclosure.

FIGS. 4A-4G illustrate user interfaces (UIs) 400a-400g, respectively, that are presented on a computer device 102a as part of an application 114a executed on the computer device 102a for analyzing tags associated with a sequence of images presented to a user to guide a user to a current interest. Referring to FIG. 4A, when starting a session of the computer-implemented method or algorithm, images appear one at a time and users interact with the images to populate a dynamic sequence of images. According to the various configurations of the system 100, the images are pushed by the server 106, from the database 108, to the application 114a on the computer 102a. Alternatively, the images may be retrieved from the database 108 by the application 114a, either directly or through the server 106. Alternatively, the images may be contained within the application 114a on the computer 102a. FIG. 4A illustrates the main UI 400a of the computer-implemented method or algorithm 200a. As shown, the UI 400a includes an image 402a. The image 402a represents a physical object. In the specific example of FIG. 4A, the image 402a is a digital photograph of loaves of bread, which represents the physical object of bread and could have been taken by someone perusing a store or restaurant serving these loaves of bread and posted to an online social media networking service, for example. Below the image 402a are user interface elements 404a and 404b. Specifically, the user interface elements 404a and 404b allow a user to enter inputs associated with the image 402a, and the corresponding physical object represented by the image, for the user to provide a preference for the physical object represented by the image 402a. For example, the user interface element 404a is an icon of an X, which corresponds to a negative preference, and the user interface element 404b is an icon of a checkmark, which corresponds to a positive preference. The UI 400a also includes a main toolbar 406 that allows the user to navigate within the application 114a. Within the main toolbar 406 are icons corresponding to functions of the application 114a, including a Feed icon 406a, a Restaurants icon 406b, a Crave Search icon 406c, and a My Profile icon 406d. The Crave Search icon 406a initiates a session of the computer-implemented process or algorithm 200a that begins the process or algorithm for analyzing tags associated with a sequence of images presented to a user to present a current interest of the user. Thus, prior to the UI 400a being presented in the display device 112a or the computer 102a, the user, for example, selected the Crave Search icon 406c.

FIG. 4B shows a subsequent user interface after the UI 400a. Specifically, upon the user selecting one of the user interface elements 404a or 404b, the UI 400a transitions to UI 400b. UI 400b includes a new image 402b. Like image 402a, the image 402b represents a physical object. In the specific example of FIG. 4B, the image 402b is a digital photograph of beef stir-fry, which represents the physical object of a food dish of beef stir-fry. By way of example, the user may have selected the user element 404a to indicate that the user has a negative preference (e.g., dislike) for the

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physical object of bread represented by the image 402a. In response, the computer-implemented method or algorithm 200a determined a next set of tags that does not include tags from the previous set of tags associated with the image 402a, and determined an image (e.g., image 402b) that is associated with the next set of tags to present to the user. Accordingly, the image 402b of the beef stir-fry does not have the same primary tags as the primary tags associated with the image 402a of the loaves of bread.

FIG. 4C shows a subsequent user interface after the UI 400b. The UI 400c of FIG. 4C may be after several rounds of the computer-implemented method or algorithm 200a selecting next sets of tags and images associated with the next sets of tags, and receiving inputs from the user indicating preferences for the physical objects represented by the images. By way of explanation, the UI 400c may be presented after an N number of images were previously presented. Thus, the UI 400c includes a new image 402c. Like images 402a and 402b, the image 402c represents a physical object. In the specific example of FIG. 4C, the image 402b is a digital photograph of sushi, which represents the physical object of a dish of sushi.

FIG. 4D shows a detailed view UI 400d associated with the image 402c in FIG. 4C. By way of example, the UI 400c transitions to the UI 400d by the user selecting the image 402c in the UI 400c. The UI 400d includes the same image 402c in FIG. 4C. In addition, the UI 400d includes user interface elements 408a and 410a. User interface element 408a corresponds to a title or caption associated with the image 402c. The title or caption of the user interface element 408a is a text string that describes the physical object that is represented by the image 402c. By way of example, where the image 402c shows sushi, the user interface element 408a includes the caption California sushi roll. User interface element 410a lists the tags that are associated with the image 402c. The user interface element 410a allows a user to directly see the tags that are associated with the image 402c and, therefore, also associated with the physical object that is represented by the image 402c. By way of example, the user interface element 410a includes the tags sushi, roll, raw, Japanese, vegetable, and cold.

FIG. 4E shows a UI 400e that includes a recommendation for a restaurant based on the currently presented image 402d, which is presented based on the computer-implemented process or algorithm 200a. For example, the user may have indicated a negative preference or dislike in response to being presented the image 402c. Based on reverting back to the tags that were last associated with a positive response (for example, 402b), the computer-implemented process or algorithm 200a may have determined the image 402d as the next image to present to the user. Similar to the UI 400d, the UI 400e includes a detailed view associated with the currently presented image 402d. As shown, the image 402d shows a digital photograph of pork chops, which is indicated by the user interface element 408b. Specifically, the user interface element 408b shows the caption of Pork Chops with Ripieno. The UI 400e further includes the user interface element 410b, which provides the tags that are associated with the image 402d. As shown, the tags include herbs, wok, breadcrumbs, pork chops, and dinner. Further, the UI 400e includes the user interface element 412. The user interface element 412 provides an indication of a number entities within the area, for example, defined by the location of the user, the computer 102a, or both, that offer the physical object that is associated with the image 402a. Specific to the illustrated example, the user interface element 412 indicates the number of restaurants within the location of the user that

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offer the food dish that is represented by the image 402d. As shown, there are 15 restaurants within a threshold location of the user that offer the food dish of pork chops with ripieno that is associated with the image 402d.

The user interface element 412 may be presented to the user within the UI 400e in response to the user providing an indication that the user is interested in obtaining the physical object associated with the image 402d. Such an indication can be provided according to various methods, such as the user double tapping or selecting the image 402d. In response, the application 114a presents the user interface element 412 within the UI 400e. Thus, once a user is guided to a physical object that the user is interested in, such as craving in the case of a food dish, the computer-implemented process or algorithm 200a allows the user to obtain information on entities that offer the physical object. In this case, the entities are the 15 restaurants. In response to the user selecting the user interface element 412, the application 114a causes a transition between the UI 400e and the UI 400f.

FIG. 4F shows the UI 400f, which includes a list of recommended entities that offer the physical object that the user indicated as being interested in obtaining additional information in. The UI 400f includes a list of entities 414a-414g, specifically restaurants, that offer the physical object associated with the image 402d. From the UI 400f, the user is able to choose a specific entity from the list of entities 414a-414g. Upon selecting an entity, such as the first entity associated with the first user interface element 414a, the application 114a causes a transition between the UI 400f to the UI 400g.

FIG. 4G shows a UI 400g that provides information regarding a specific entity that offers the physical object associated with the image 402d. In the case of a restaurant, the UI 400g includes an image 416 of the exterior of the restaurant. Below the image 416, the UI 400g includes the name of the restaurant and the address of the restaurant. The UI 400g also includes a user interface element 418. The user interface element 418 can be associated with a hyperlink to a website that is associated with the restaurant. Alternatively, the user interface element 418 may direct the user to a landing site within the application for restaurant. The landing site for the restaurant may provide information regarding the restaurant, such as the information that is contained with the restaurant profile stored within the database 108. According to some embodiments, the landing site for the restaurant may allow a user to purchase the food dish through the application 114a, rather than being directed to an Internet web site from which the user can purchase the food dish.

FIG. 4H shows a UI 400h for a user to upload and associate an image of a physical object into the system 100, such as stored within the database 108 of the system 100. The UI 400h includes an area 420 to display the image that will be associated with the physical object. The image can be obtained according to various methods, such as a camera integrated within the computer 102a, such as in the case of a smartphone, or by linking to an image on the Internet or saved in a memory device of the computer 102a. Similar to the UI 400f, the UI 400h also includes a user interface element 422 that allows a user to insert a title or a caption for the image. The UI 400h also includes a user interface element 424 to associate the image within the area 420 with one or more tags that describe the physical object represented by the image. The UI 400h also includes a user interface element 426 to associate a location with the image and the physical object. The location can either be deter-

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mined automatically, such as through components and/or modules within the computer 102a (e.g., Global Positioning System receivers), or can be manually entered by the user.

FIG. 4I illustrates the UI 400i as the user enters information within the user interface elements 422 and 422. For example, the user may be uploading an image of a food dish. The food dish may specifically be beef stir-fry. The user may have selected the tags hot, wok, and Chinese to describe the food dish (e.g., physical object) represented by the image. To 10 select the tags and enter the caption, the UI 400i includes a virtual keyboard 428. However, the user can enter the text according to various other user interface devices. Once the user has completed entering the information, the image is 15 uploaded to the database 108. FIG. 4J shows the UI 400j that includes the user interface element 430, which indicates a successful upload of the image and the associated information, such as the tags, the caption, and the location.

FIGS. 4K and 4L show user interfaces associated with a user viewing aspects of the user's profile. Specifically, FIG. 20 FIG. 4K shows UI 400k associated with a user profile, including the tags that the user is associated with based on the user interface element 432. As shown, the user profile indicates 25 that the user is associated with the tags Talian, Asian, Burger joints, Romantic, Delivery, Music, Healthy food, Fresh, among other tags. The tags are associated with the user by the user manually selecting certain tags from all of the tags that are stored in the database 108 that the user has a positive 30 preference for (e.g., likes). Alternatively, the tags are associated with the user implicitly by the user's interaction with the tags over time, such as the user having the habit of 35 selecting images and/or physical objects that the user prefers that are associated with the tags in the user interface element 432. The UI 400k also includes images (e.g., digital photographs) that the user has provided a positive preference for (e.g., liked) during interaction with the application 114a.

FIG. 4L includes the UI 400l that shows at least some 40 additional aspects of the user's profile. For example, the UI 400l includes user interface elements 436 and 438. The user interface element 436 includes social media information 45 regarding the user, such as an icon of the user, the user's location (e.g., city and state), and how many users the user is following and are following the user. The user interface element 438 includes images that the user has uploaded into the system 100, such as through the flow illustrated in FIGS. 4H-4J. The UI 400l can include other information within the 50 system 100, not just the information specifically referenced herein with respect to FIGS. 4A-4L. For example, the UI 400l can include a feature for users called The Top 100, which highlights the top rated images and/or physical 55 objects associated with the images at any given moment. The Top 100 images can be out of all of the images stored within the database 108, all of the images within the database 100 that are relevant to the user based on the images being associated with tags that the user has liked, or all of the images of physical objects that are offered within a pre-defined area surrounding the user's current location. The images representing the physical objects with the most 60 positive preferences will be featured on The Top 100, which provides users the incentive to upload physical objects (e.g., such as food dishes) that are their favorite physical objects. For example, this will encourage users to share their best meals in the hopes of being in The Top 100. The Top 100 list allows users to gain attention. In the social media realm, the 65 applications 114a, 114b allow users to attract more followers as well as support, for example, their favorite restaurants (e.g., entities). The Top 100 lists will also be active, allowing user to select an image within The Top 100 list to be taken

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to a page associated with a profile of the entity that offers the physical object represented by the image.

While this disclosure is susceptible to various modifications and alternative forms, specific embodiments or implementations have been shown by way of example in the drawings and will be described in detail herein. It should be understood, however, that the disclosure is not intended to be limited to the particular forms disclosed. Rather, the disclosure is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention(s) as defined by the appended claims.

Each of these embodiments, and obvious variations thereof, is contemplated as falling within the spirit and scope of the claimed invention(s), which are set forth in the following claims. Moreover, the present concepts expressly include any and all combinations and sub-combinations of the preceding elements and aspects.

What is claimed is:

1. A computer-implemented image search method filtered by multiple human-machine inputs on images presented to a user of the image search method, the method comprising the steps of:

determining a plurality of different digital images to present on the video display device to generate a sequence of digital images, each of the digital images being associated with a plurality of tags indicating one or more attributes of an image featured in the corresponding digital image;

receiving, via a user input device, an unfavorable indication of a disinclination for the image features in the one of the digital images, the unfavorable indication being one of at least two input options, the at least two input options including, among the unfavorable indication, a favorable indication of a preference for the image featured in one of the digital images;

analyzing at least some of the tags to determine a next set of tags associated with a subsequent digital image;

adjusting weights of at least some of the tags based on an association relative to tags within the same category of tags to which the subsequent digital image belongs;

transitioning the one of the digital images with the subsequent digital image on the video display device to replace the one of the digital images with the subsequent digital image on the video display device; and receiving via the user input device a further input corre-

sponding to one of the at least two input options including a favorable indication for the subsequent digital image and an unfavorable indication for the subsequent digital image.

2. The method of claim 1, wherein the corresponding image featured on respective ones of the at least some of the digital images are consumer goods, food dishes, clothing, automobiles, physical locations, vacation spots, museums, or sports venues.

3. The method of claim 1, further comprising: displaying on the video display device graphical user interface elements corresponding to a like virtual button and a dislike virtual button, wherein the like virtual button when selected indicates the favorable indication and wherein the dislike virtual button when selected indicates the unfavorable indication.

4. The method of claim 1, in response to receiving the favorable indication for the image featured in the one of the digital images, increasing weights of at least some of the tags associated with the one of the digital images based on an association relative to tags within the same category of tags to which the subsequent digital image belongs.

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5. The method of claim 4, wherein a subsequent digital image to be presented in response to the favorable indication is required to have at least some of the tags associated with the one of the digital images.

6. The method of claim 5, wherein the subsequent digital image in response to the favorable indication is required to have all of the tags associated with the one of the digital images.

7. The method of claim 1, further comprising processing at least some of the tags differently in response to the favorable indication versus the unfavorable indication.

8. The method of claim 7, wherein the processing is based on a number of times a user indicates a preference for the one of the digital images.

9. A computer-implemented image search method, comprising the steps of:

determining a plurality of digital images to present on a video display device of a computer, each of the digital images being associated with a plurality of tags; repeating, as long as human-machine inputs are received from a user input device indicating a like or dislike preference of a user for a selected digital image of the digital images, the steps of:

processing the tags associated with the selected digital image to determine a next set of tags associated with a subsequent digital image to be presented on the video display;

in response to the dislike preference, the processing including adjusting weights of at least some of those of the processed tags in the same category as the tags associated with the selected digital image so that the subsequent digital image has a different set of associated tags from those associated with the selected digital image, and replacing the selected digital image with the subsequent digital image on the video display device;

in response to the like preference, the processing including adjusting weights of at least some of the processed tags so that the subsequent digital image has at least some of the same tags as those associated with the selected digital image, and presenting the subsequent digital image on the video display device;

wherein the repeating causes the image search method to iteratively resolve toward at least one digital image presented on the video display device, which satisfies a subjective need of the user via the multiple human-machine inputs, and the repeating includes at least one like preference and at least one dislike preference.

10. The method of claim 9, wherein in response to the like preference, the subsequent digital image is required to have all of the tags associated with the selected digital image.

11. A computer-implemented image search method, comprising the steps of:

determining a plurality of digital images to present on a video display device of a computer, each of the digital images being associated with a plurality of tags; repeating, as long as human-machine inputs are received from a user input device indicating one of at least two input options for a selected image of the digital images, the at least two input options including a favorable indication of a preference for the image featured in one of the digital images and an unfavorable indication of a disinclination for the image featured in the one of the digital images, the steps of:

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processing the tags associated with the selected digital image to determine a next set of tags associated with a subsequent digital image to be presented on the video display;

in response to the unfavorable indication, the processing including adjusting weights of at least some of those of the processed tags in the same category as the tags associated with the selected digital image so that the subsequent digital image has a different set of associated tags from those associated with the selected digital image, and replacing the selected digital image with the subsequent digital image on the video display device; 5

in response to the favorable indication, the processing including adjusting weights of at least some of the processed tags so that the subsequent digital image has at least some of the same tags as those associated with the selected digital image, and presenting the subsequent digital image on the video display device; 10

wherein the repeating causes the image search method to iterate toward at least one digital image presented on the video display device, which satisfies a subjective need of the user via the multiple human-machine inputs, and the repeating includes at least one favorable 15 indication and at least one unfavorable indication. 20

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* * * * *

Exhibit C

to

Complaint for Patent Infringement

Claim Chart¹ for the '786 Patent

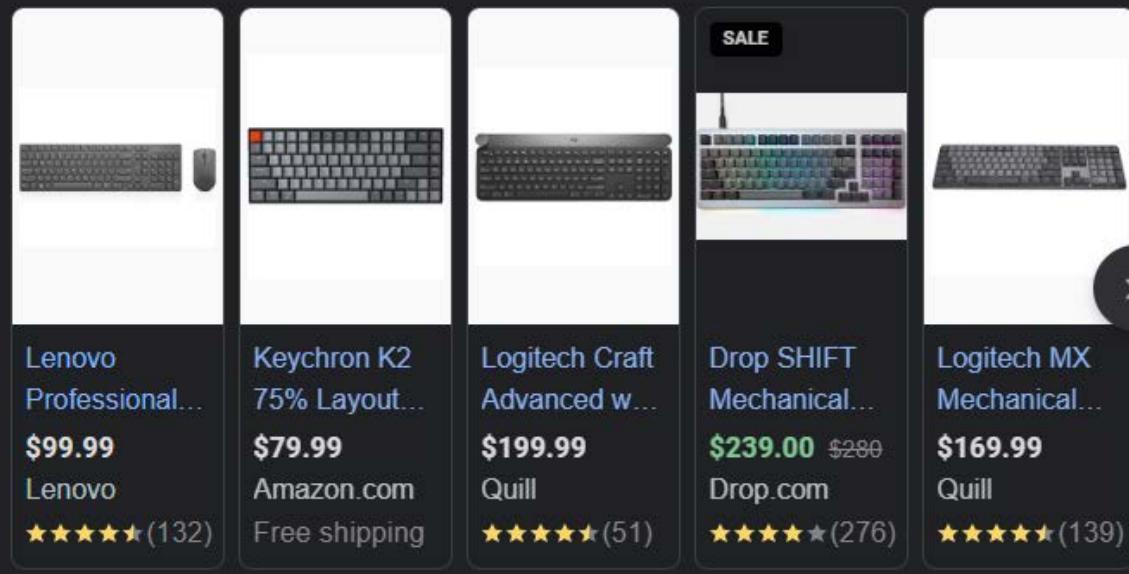
¹ Plaintiff provides this exemplary claim chart for the purposes of showing one basis of infringement of one of the Patents-in-suit by Defendant's Accused Products as defined in the Complaint. This exemplary claim chart addresses the Accused Products broadly based on the fact that the Accused Products infringe in the same general way. Plaintiff reserves its right to amend and fully provide its infringement arguments and evidence thereof until its Preliminary and Final Infringement Contentions are later produced according to the court's scheduling order in this case.

CLAIM CHART

U.S. PATENT NO. 9,323,786 – Claim 1

Claim 1	Corresponding Structure in Accused Systems – Google LLC.
<p>1. A computer-implemented method comprising:</p>	<p>Google LLC provides an advertising service known as Google Ads that shows ads on the Google search engine, other Google services such as YouTube, and any websites that use Google Ads for ad revenue. Many of these ads are known as personalized ads, where the content of the ad is personalized to the user. Google connects consumers with advertisements. <i>See https://ads.google.com/home/#/. See https://adssettings.google.com/authenticated. See https://safety.google/privacy/data/.</i></p> <p>Google LLC uses a computer network to connect its consumers and advertisers. Google shows ads to users through the Google search engine, Google services such as YouTube, the Display Network, and any other websites that use Google Ads. <i>See https://support.google.com/google-ads/answer/1704373?hl=en#:~:text=They%20can%20appear%20beside%2C%20above,websites%20of%20Google%20search%20partners.</i></p> <p>Because infringement liability is not dependent on ownership, e.g., use of a system can infringe (35 U.S.C. § 271), infringement is not dependent on ownership of all limitations of a claim.</p>
<p>receiving, from an electronic device associated with a user, an indication of an instance of an application executed on the electronic device, wherein the application, together with one or more computer devices, is configured to direct the user to a current interest associated with a category of physical objects;</p>	<p>Google Ads shows ads on the Google search engine, Google services, the Display Network, and any other websites that use Google Ads. These ads are shown to users whenever users use these websites or services. <i>See https://ads.google.com/home/#/. See https://support.google.com/google-ads/answer/1704373?hl=en#:~:text=They%20can%20appear%20beside%2C%20above,websites%20of%20Google%20search%20partners.</i></p>

Ads · Shop best keyboards



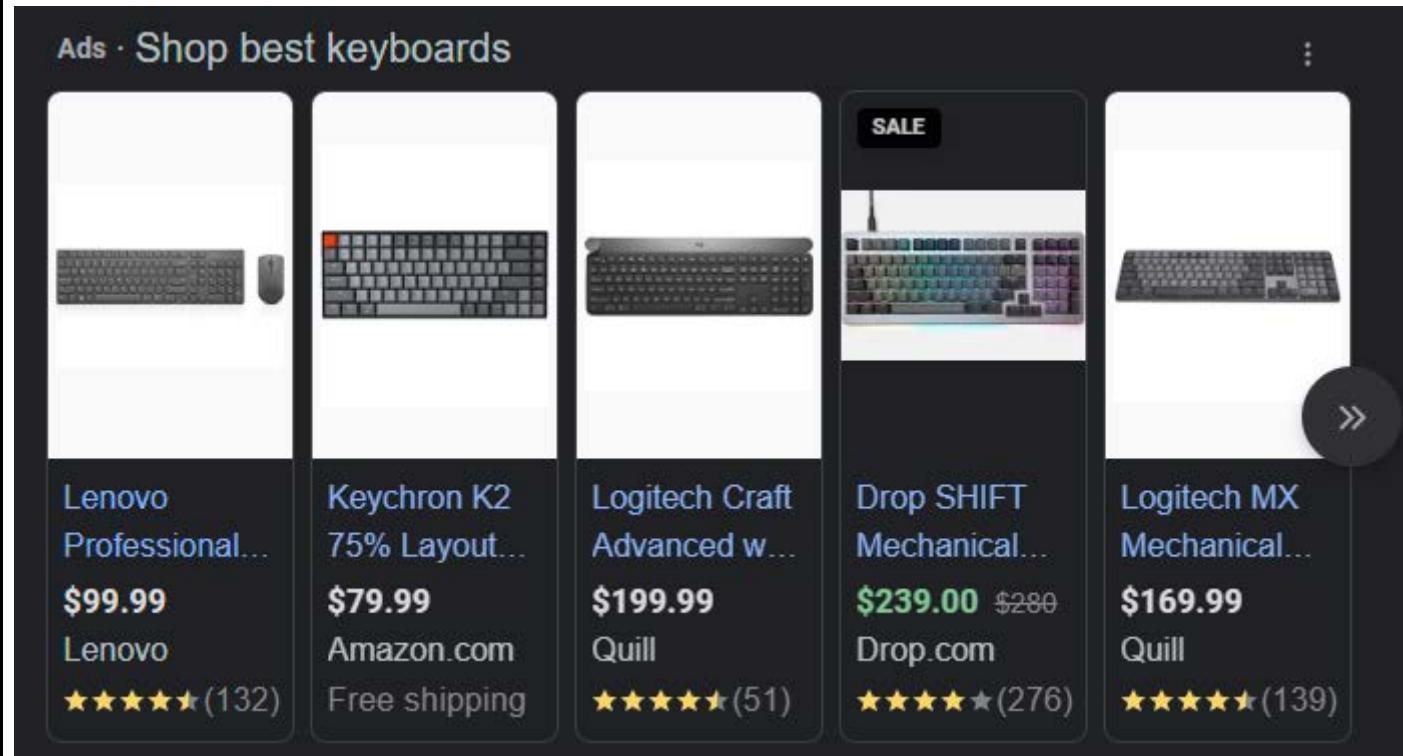
Ads shown on the first page of the Google search engine after searching for “best keyboards”.

The ads pertain to physical objects and the users access the website via an electronic device. The instance of the application is accessed on an electronic user device through the mobile app or browser version of the platform. The data including the application and other information pertaining to elements of the application are stored using one or more computer devices in a physical or cloud based environment.

determining, by the one or more computer devices, a plurality of tags specific to the user, from among a pool of tags, based on each tag of the plurality of tags specific to the user being associated with a profile of the user;	Google and Google Ads use cookies as tags to track users and to create a profile for users when users visit Google websites or services. These cookies and profiles are used to show personalized ads and other recommendations. <i>See</i> <u>https://policies.google.com/technologies/cookies?hl=en-US</u> .
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transmitting, from the one or more computer devices, one electronic image, from among a plurality of electronic images stored on the one or more computer devices, to the electronic device, the one electronic image representing a physical object within the category of physical objects and being associated with one set of tags from the plurality of tags specific to the user, each tag of the one set of tags describing or characterizing attributes of the physical object represented by the one electronic image;

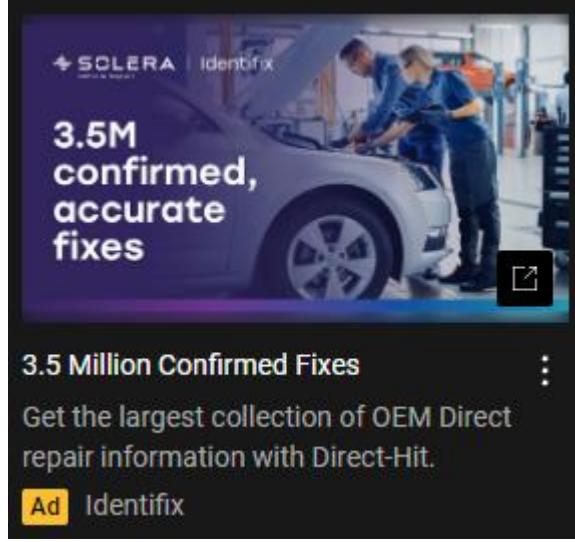
Google ads generally have a picture included with the ad. The ad is personalized to the user using cookies collected from the user device.



Ads shown on the first page of the Google search engine after searching for “best keyboards”.

causing a presentation of only the one electronic image from among the plurality of electronic images on a display of the electronic device;

Google will display ads personalized to the user after a Google search or when a user uses one of Google's services. Often these ads are a picture combined with text.



Ad shown on YouTube homepage.

receiving, from the electronic device, an input from the user indicating a preference for the physical object represented by the one electronic image;	On information and belief, clicking the ad or spending time while the ad is in view should act as input from the user that indicates a positive preference for the object represented. Ignoring the ad or quickly moving past it would be shown as a negative preference.
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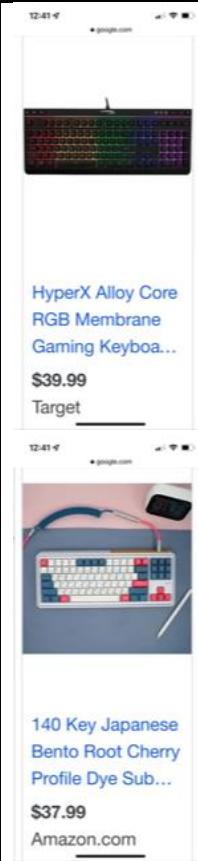
<p>processing, by the one or more computer devices, the plurality of tags specific to the user based on the preference and the one set of tags to determine a next set of tags from the plurality of tags specific to the user, the processing including:</p>	<p>Google uses cookies to assign tags and track users using the Google search engine, Google services, the Display Network, or any websites using Google Ads. These cookies allow for the tracking of tags to then be processed by a computer. The original tags are processed and more tags are added based on the user's preference to the content that includes the original tags. <i>See</i> https://policies.google.com/technologies/cookies?hl=en-US/.</p>
<p>in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being a first electronic image presented to the user during a session of directing the user to the current interest, removing the tags of the one set of tags from the plurality of tags specific to the user that are</p>	<p>Google uses several cookies as tags to track users and to create a profile for users using the Google search engine, Google services, the Display Network, or any websites using Google Ads. <i>See</i> https://policies.google.com/technologies/cookies?hl=en-US/. On information and belief, these tags, in conjunction with cookies and other tags, can register positive and negative interactions with images and ads shown to the user. These interactions may include clicking or not clicking the ad, time spent with the ad in view of the user, etc.</p>

<p>processed to determine the next set of tags, for a remainder of the session of directing the user to the current interest;</p>	
<p>in response to the preference for the physical object represented by the one electronic image being negative and the one electronic image being not the first electronic image presented to the user during the session of directing the user to the current interest, removing tags of the one set of tags that are new relative to an immediately previous set of tags from the plurality of tags specific to the user that are processed to determine the next set of tags, for the remainder of the session of directing the user to the current interest; and</p>	<p>Google uses several cookies as tags to track users and to create a profile for users using the Google search engine, Google services, the Display Network, or any websites using Google Ads. <i>See</i> https://policies.google.com/technologies/cookies?hl=en-US/. On information and belief, these tags, in conjunction with cookies and other tags, can register positive and negative interactions with images and ads shown to the user. These tags are also removed and changed as necessary to update user preferences and the user's profile with Google and Google Ads. These interactions may include clicking or not clicking the ad, time spent with the ad in view of the user, etc.</p>

<p>in response to the preference for the physical object represented by the one electronic image being positive, determining at least one additional tag from the plurality of tags specific to the user to add to the one set of tags, generating the next set of tags, the determining the at least one additional tag comprising:</p>	<p>Google uses several cookies as tags to track users and to create a profile for users using the Google search engine, Google services, the Display Network, or any websites using Google Ads. <i>See</i> https://policies.google.com/technologies/cookies?hl=en-US/. On information and belief, these tags, in conjunction with cookies and other tags, can register positive and negative interactions with images and ads shown to the user. These tags are also removed and changed as necessary to update user preferences and the user's profile with Google and Google Ads. . Negative interactions may include scrolling immediately or not clicking on the advertisement. Clicking on a product or advertisement is seen as a positive preference.</p>
<p>determining weightings of the tags within the plurality of tags specific to the user based, at least in part, on (i) a number of times each tag of the plurality of tags specific to the user appears with at least one of the one or more tags of the one set of tags for the plurality of electronic images, and (ii) a number of times each tag of the plurality of tags specific to the user is associated with a positive and/or a negative preference by the user; and</p>	<p>On information and belief, Google and Google Ads use a weighting system to determine which content will be shown to a user based on the user's profile, cookies, and other tags. This content can include ads, recommendations, and anything else Google may show to the user based on their profile and tags. The weighing system may include weights based on how long ago something was searched, and more recent searches have tags with greater weight.</p>

<p>determining the at least one additional tag based on the at least one additional tag having a highest weighting among the plurality of tags specific to the user;</p>	<p>On information and belief, Google and Google Ads uses a weighting system to determine which content will be shown to a user based on the user's profile, cookies, and other tags. This content can include ads, recommendations, and anything else Google may show to the user based on their profile and tags. A weighting system would, by definition, include a tag with a highest weight. The content including the tag with the highest weight would be most likely to be shown to the user.</p>
<p>determining, by the one or more computer devices, a next electronic image from the plurality of electronic images associated with the next set of tags, the next electronic image representing a different physical object within the category of physical objects and the next set of tags describing or characterizing attributes of the different physical object represented by the next electronic image; and</p>	<p>Tags and cookies are continually updated through Google Ads and Google's general cookie management. The positive and negative interactions with the content including the tags is used to determine the next content shown to the user.</p>
<p>generating a sequence of electronic images presented to the user one at a time on the display of the electronic device by repeating the transmitting, the causing, the receiving of the input, the processing, and the determining of the next</p>	<p>Google shows a horizontally scrolling sequence of images as described. The user may zoom in on the picture, showing only one image at a time, and continue to scroll through the ads in a horizontal fashion, one at a time.</p>

electronic image during the session with the next electronic image in place of the one electronic image to direct the user to the current interest associated with the category of physical objects.





Three different google chrome ads on a mobile device

Exhibit D

to

Complaint for Patent Infringement

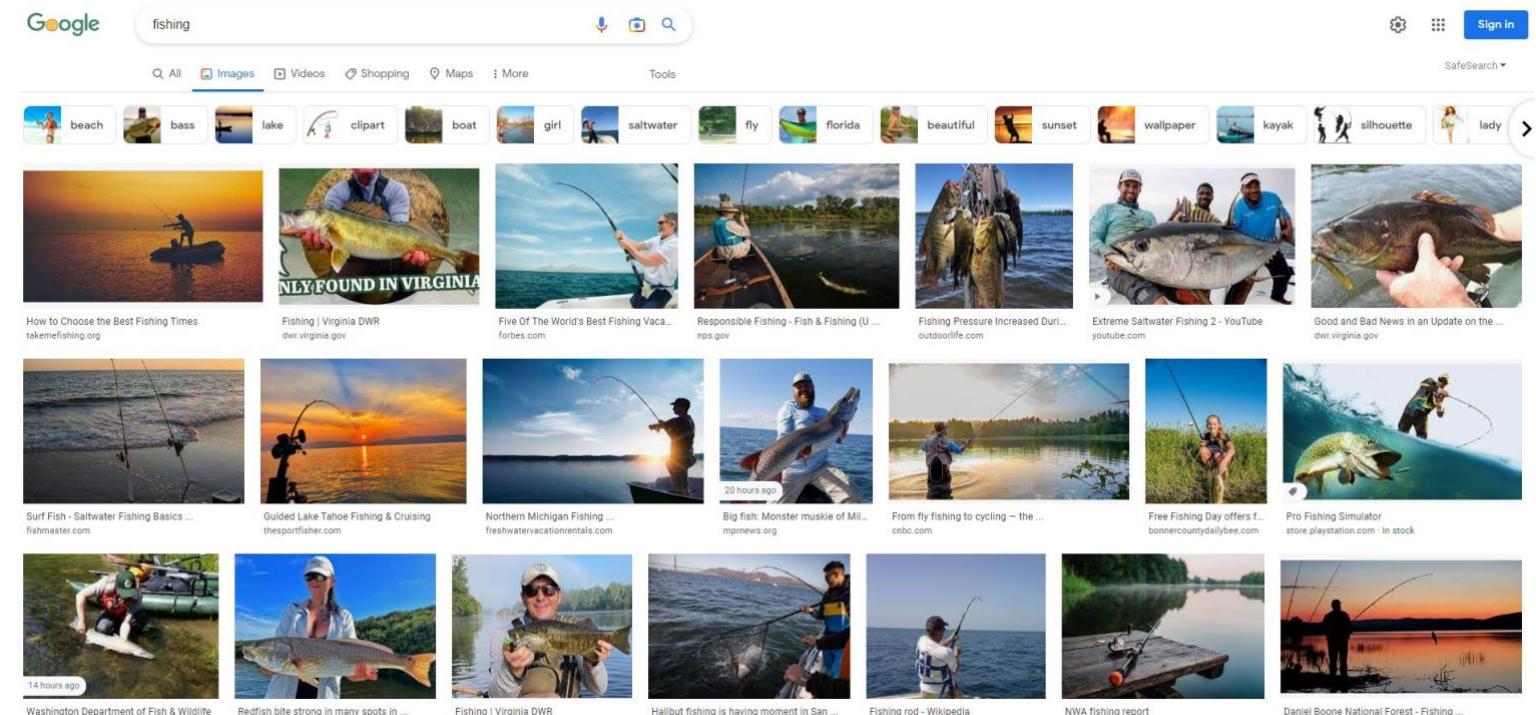
Claim Chart¹ for the '705 Patent

¹ Plaintiff provides this exemplary claim chart for the purposes of showing one basis of infringement of one of the Patents-in-suit by Defendant's Accused Products as defined in the Complaint. This exemplary claim chart addresses the Accused Products broadly based on the fact that the Accused Products infringe in the same general way. Plaintiff reserves its right to amend and fully provide its infringement arguments and evidence thereof until its Preliminary and Final Infringement Contentions are later produced according to the court's scheduling order in this case.

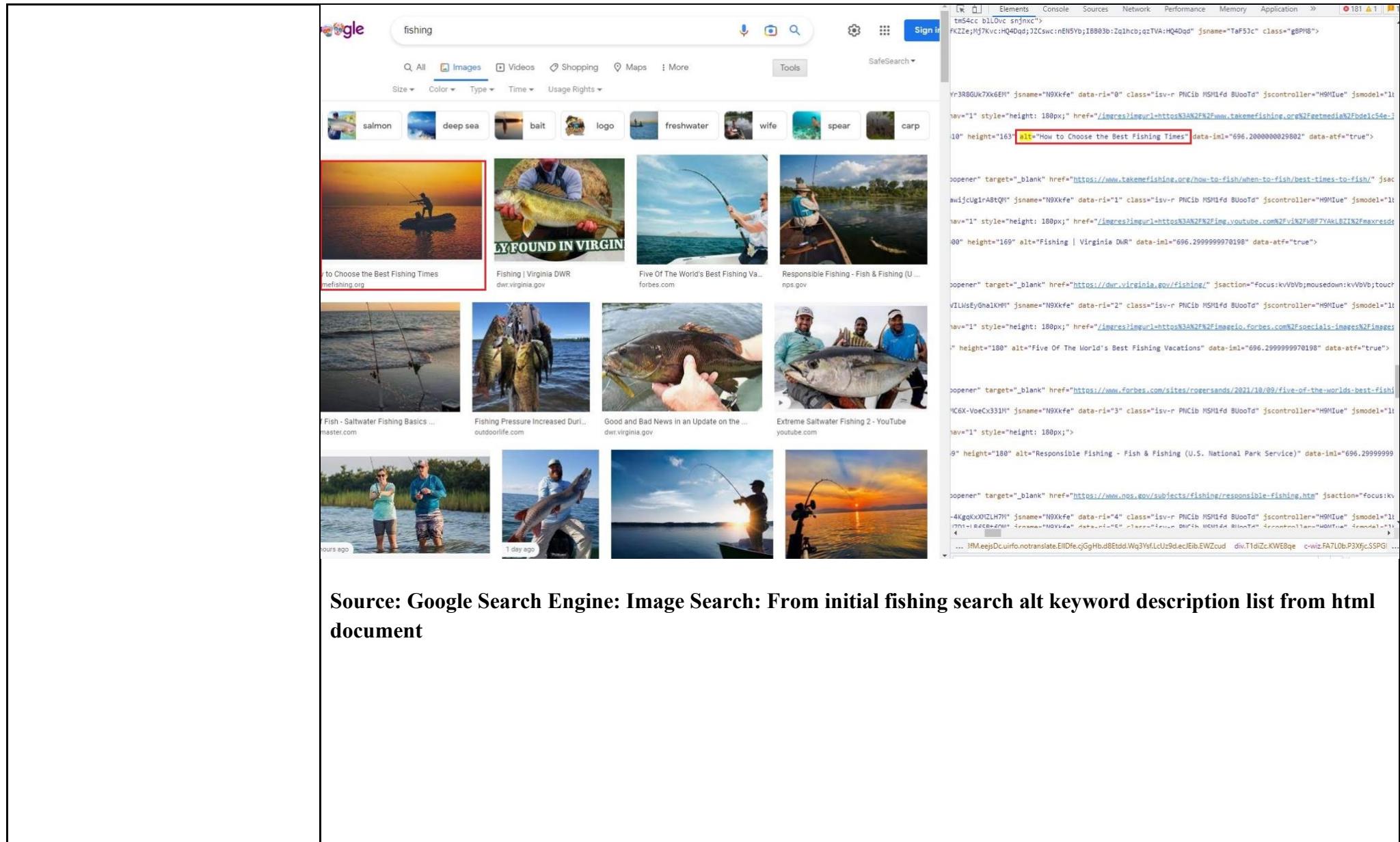
CLAIM CHART

U.S. PATENT NO. 10,474,705– Claim 1

Claim 1	Corresponding Structure in Accused Systems – Google LLC.
<p>1. A computer-implemented image search method filtered by multiple human-machine inputs on images presented to a user of the image search method, the method comprising the steps of:</p>	<p>Google LLC provides a computer implemented image search method through both Google image search and YouTube. Both of these Google services are filtered by human machine inputs and present digital images based off those inputs. Google makes use of keyword tags on YouTube and descriptor keyword tags for Google images both are used to differentiate content for its users and sorting algorithms.</p> <p>https://developers.google.com/search/docs/appearance/google-images#use-descriptive-alt-text</p> <p>Google offers specific user engagement input options to users such as the like and dislike option. This facilitates a filtering system for Google's app's such as YouTube. There is a ranking feature in place so that based on user inputs, subsequent images will have their internal ranking either increase or decrease. The higher the ranking the more likely images with similar attributes are to be seen by the user. The lower the ranking the less likely an image with similar attributes is to be seen by the user.</p> <p>https://support.google.com/websearch/answer/7585859?hl=en</p> <p>https://www.google.com/search/howsearchworks/how-search-works/ranking-results/#relevance</p> <p>https://developers.google.com/search/docs/appearance/google-images</p>
<p>determining a plurality of different digital images to present on the video display device to generate a sequence of digital images, each of the digital images being associated with a plurality of tags indicating one or more attributes of an image featured in the corresponding digital image;</p>	<p>The plaintiff contends that Google generate a plurality of digital images and videos through their various services. Through Google image search a plurality of different digital images are generated for the user that use alt text descriptions to differentiate content within the image. Another Google service YouTube generates a plurality of digital images and video's that use a tag keyword system to connect the post to some related attributes. Each YouTube post having any number of tags.</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>



Source: Google Search Engine: Image Search: A simple search using the fishing keyword tag which displays digital images that have the related keyword tags.



Source: Google Search Engine: Image Search: From initial fishing search alt keyword description list from html document

Use descriptive alt text

Alt text (text that describes an image) improves accessibility for people who can't see images on web pages, including users who use screen readers or have low-bandwidth connections.

Google uses alt text along with computer vision algorithms and the contents of the page to understand the subject matter of the image. Also, alt text in images is useful as anchor text if you decide to use an image as a link.

When choosing alt text, focus on creating useful, information-rich content that uses keywords appropriately and is in context of the content of the page. Avoid filling alt attributes with keywords ([keyword stuffing](#)) as it results in a negative user experience and may cause your site to be seen as spam. Also consider the accessibility of your alt text, and add the alt attribute as necessary, per [W3 guidelines](#).

- **🚫 Bad (missing alt text):** ``
- **🚫 Bad (keyword stuffing):** ``
- **✓ Better:** ``
- **✓ Best:** ``

We recommend testing your content by [auditing for accessibility](#) and [using a slow network connection emulator](#).



Source: <https://developers.google.com/search/docs/appearance/google-images#use-descriptive-alt-text>

Source: YouTube app: A simple search using the fishing tag which displays digital image thumbnails for videos that have the related keyword tags.

```

<link rel="search" type="application/opensearchdescription+xml" href="https://www.youtube.com/opensearch?locale=en_US">
<link rel="manifest" href="https://manifest.webmanifest" crossorigin="use-credentials">
<script nonce="K-wnJ5_2CRFECkzH7QvQ" if=(window.ytcsi.tick('bc', null, ''));>/</script>
<link rel="preload" href="https://r1---sn-o50lsnd6.googlevideo.com/generate_204" as="fetch">
<link rel="preload" href="https://r1---sn-o50lsnd6.googlevideo.com/generate_204?rnone" as="fetch">
<script src="/s/olaver/03bec5d/olaver.ias?v=1&set=sn-US/base.js" nonce="K-wnJ5_2CRFECkzH7QvQ" class="js-httpswwwyo">
<link rel="canonical" href="https://www.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="alternate" media="handheld" href="https://m.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="alternate" media="only screen and (max-width: 640px)" href="https://m.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="title">
<meta name="title" content="Kayak Fishing SKINNY WATER River During DROUGHT -- (GUADALUPE RIVER PT. 1)">
<meta name="description" content="Use Code JONB To save 10% OFF Googan Baits -- https://googansquad.com/Filmed & Edited by Caleb Tacia - Instagram: @calebtacia Show more" style="display: none;">
<meta name="keywords" content="fishing, survival, camping, outdoors, cooking, fish, bass, lures, travel, traveling">
<link rel="shortlink" href="https://youtu.be/H3fGtGt-Xk">
<link rel="alternate" href="https://com.google.android.youtube/http://www.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="alternate" href="https://www.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="alternate" href="https://m.youtube.com/watch?v=H3fGtGt-Xk">
<link rel="alternate" href="https://www.youtube.com/embed?format=json&url=https%3A%2F%2Fwww.ytimg.com%2Fv%2FH3fGtGt-Xk%2Fmaxresdefault.jpg">
<meta property="og:site_name" content="YouTube">
<meta property="og:url" content="https://www.youtube.com/watch?v=H3fGtGt-Xk">
<meta property="og:title" content="Kayak Fishing SKINNY WATER River During DROUGHT -- (GUADALUPE RIVER PT. 1)">
<meta property="og:image" content="https://i.ytimg.com/vi/_H3fGtGt-Xk/maxresdefault.jpg">
<meta property="og:image:width" content="1280">
<meta property="og:image:height" content="720">
<meta property="og:description" content="Use Code JONB To save 10% OFF Googan Baits -- https://googansquad.com/Filmed & Edited by Caleb Tacia - Instagram: @calebtacia Show more" style="display: none;">
<meta property="al:ios:app_store_id" content="544007664">
<meta property="al:ios:app_name" content="YouTube">
<meta property="al:ios:url" content="vnd.youtube://www.youtube.com/watch?v=H3fGtGt-Xk&feature=applinks">
<meta property="al:android:url" content="vnd.youtube://www.youtube.com/watch?v=H3fGtGt-Xk&feature=applinks">
<meta property="al:web:url" content="http://www.youtube.com/watch?v=H3fGtGt-Xk&feature=applinks">
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<meta property="og:video:url" content="https://www.youtube.com/embed/_H3fGtGt-Xk">
<meta property="og:video:secure_url" content="https://www.youtube.com/embed/_H3fGtGt-Xk">
<meta property="og:video:type" content="text/html">
<meta property="og:video:width" content="1280">
<meta property="og:video:height" content="720">
<meta property="al:android:app_name" content="YouTube">
<meta property="al:android:package" content="com.google.android.youtube">
<meta property="og:video:tag" content="fishing">
<meta property="og:video:tag" content="survival">
<meta property="og:video:tag" content="camping">
<meta property="og:video:tag" content="outdoors">
<meta property="og:video:tag" content="cooking">
<meta property="og:video:tag" content="fish">
<meta property="og:video:tag" content="bass">
<meta property="og:video:tag" content="lures">
<meta property="og:video:tag" content="travel">
<meta property="og:video:tag" content="travelina">

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Source: YouTube app: From initial fishing search keyword tags list from html document

Add tags to your YouTube videos

Tags are descriptive keywords you can add to your video to help viewers find your content. Your video's title, thumbnail, and description are more important pieces of metadata for your video's discovery. These main pieces of info help viewers decide which videos to watch.

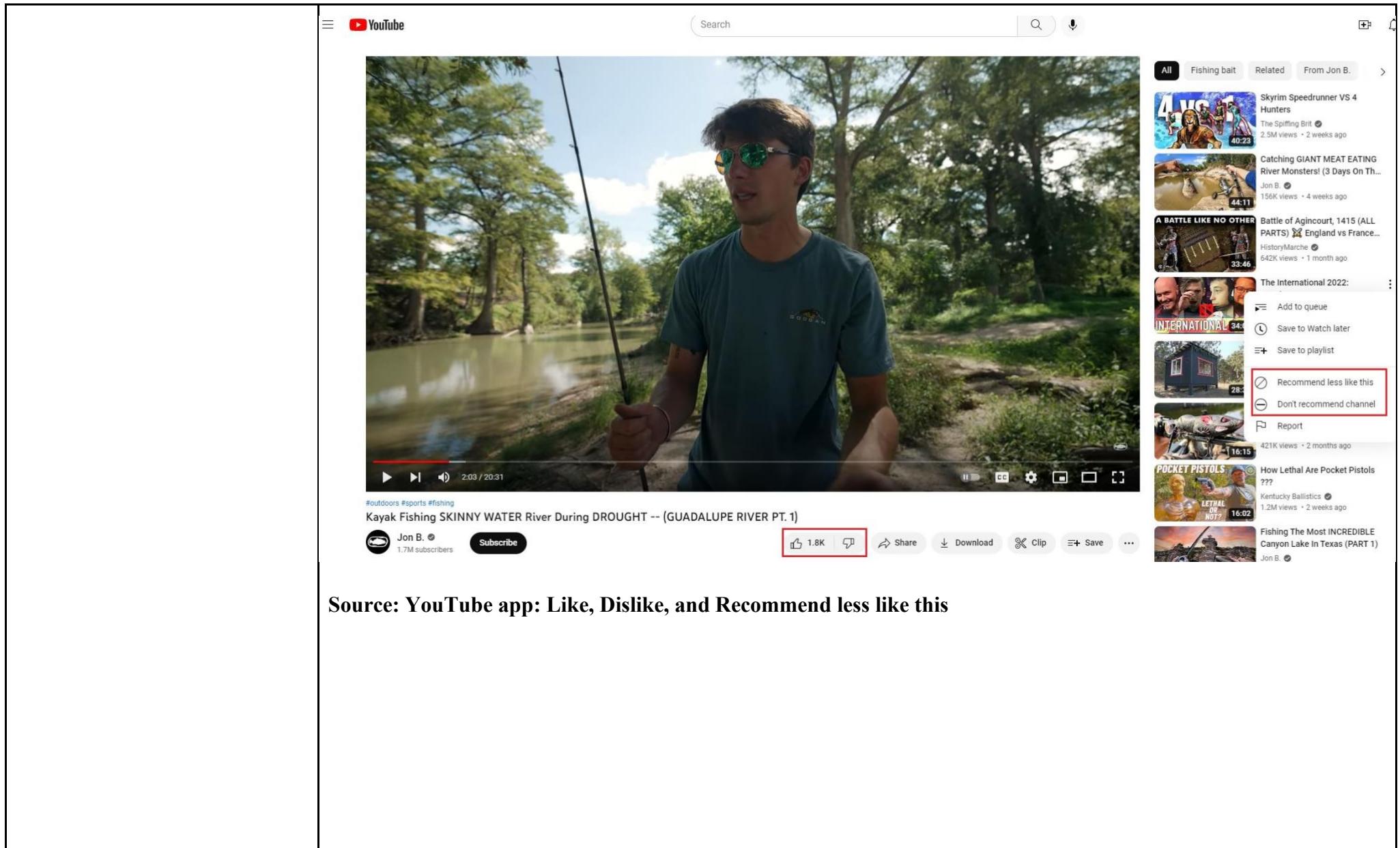
Tags can be useful if the content of your video is commonly misspelled. Otherwise, tags play a minimal role in your video's discovery.



Note: Adding excessive tags to your video description is against our policies on spam, deceptive practices, and scams.

Source: <https://support.google.com/youtube/answer/146402?hl=en>

<p>receiving, via a user input device, an unfavorable indication of a disinclination for the image features in the one of the digital images, the unfavorable indication being one of at least two input options, the at least two input options including, among the unfavorable indication, a favorable indication of a preference for the image featured in one of the digital images;</p>	<p>The plaintiff contends that Google's YouTube service offers users the ability have the option of selecting 'Recommend less like this' on any post, including digital images, and that the YouTube app will "suggest fewer posts like this" based off that disinterest. In addition, YouTube app users will have the ability to indicate favor for any post including, digital images using the like option. Users will also have the ability to indicate disfavor for any post including digital images using the dislike option.</p> <p>Content pertaining to tags that are perceived as negative will be less likely to be shown to that specific user. Negative engagement factors such as use of 'Recommend less like this' or dislikes decrease the posts rank in the Google's content ranking algorithm. Content with associated factors such as tags may be affected in future candidate selection. Content that has been liked by a user will rank higher in Google's selection algorithm. Thus, posts with higher positive engagement factors such as likes are more likely to have associated factors like tags have higher preference in Google's content ranking algorithm.</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>
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Source: YouTube app: Like, Dislike, and Recommend less like this

<p>analyzing at least some of the tags to determine a next set of tags associated with a subsequent digital image;</p>	<p>Plaintiff contends that Google's services YouTube and Google Image search use algorithms to both generate and choose the next image based off of a number of candidates to display to the user. Each considered candidate having any number of tags.</p> <p>Google's search and ranking system generates a large number of images from webpages in Google's search index. The results are then analyzed and narrowed down based off the user's query, relevance, usability of pages, expertise of sources, freshness, and users' location and settings. Weights of each factor depend on the nature of the query. Each image will have associated descriptive keywords tags.</p> <p>Google's YouTube app uses a separate algorithm to recommend content to its users. The YouTube app will recommend relevant content based on a number of factors such as user subscriptions, videos watched by similar viewers, user engagement, user watch and search history. New and previous recommendations will include associated keyword tags.</p> <p>https://support.google.com/youtube/topic/9257532?hl=en&ref_topic=9257610</p> <p>https://www.google.com/search/howsearchworks/how-search-works/ranking-results/#relevance</p> <p>https://developers.google.com/search/docs/appearance/structured-data/image-license-metadata?visit_id=638029268757455422-1184707528&rd=1</p> <p>https://developers.google.com/search/docs/appearance/google-images#use-descriptive-alt-text</p> <p>https://developers.google.com/search/docs/appearance/google-images</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>
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Google Search consumer information

When you search on Google, ranking systems sort through billions of web pages in our Search index to give you useful information in a fraction of a second.

These ranking systems are made up of a series of algorithms that analyze what it is you're looking for and what information to return to you. And as we've evolved Search to make it more useful, we've refined our algorithms to assess your searches and the results in finer detail to make our services work better for you.

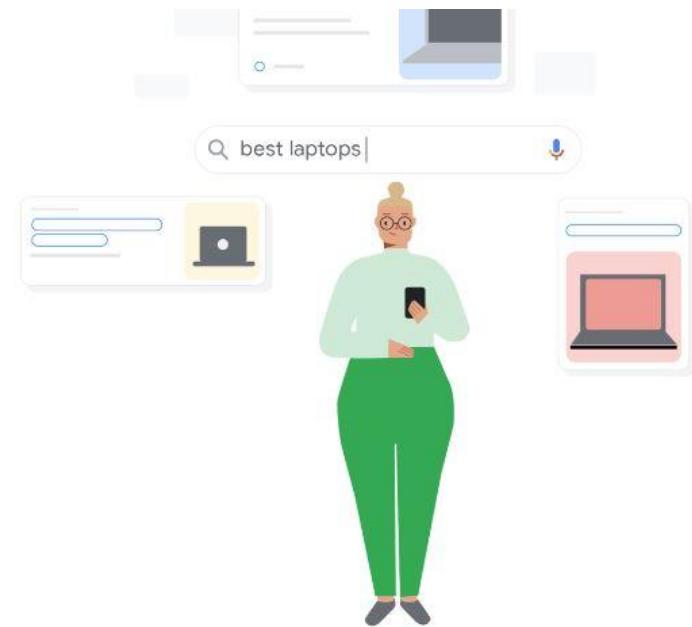
To give you the most useful information, Search algorithms look at many factors, including the words of your query, relevance and usability of pages, expertise of sources, and your location and settings. The weight applied to each factor varies depending on the nature of your query—for example, the freshness of the content plays a bigger role in answering queries about current news topics than it does about dictionary definitions.

To ensure you can trust how Google ranks results, we never accept payment to be included in search results or to be ranked higher in search results. We believe relevant ads can be as useful as actual search results, but we don't want anyone to be confused about which is which. When we do show ads, they're always clearly labeled. We show ads only when we believe they're relevant to the search terms you've entered and could be useful to your search. If we have no relevant ads, we show no ads at all. To learn more about why a Search ad is relevant: Click Info

Source: <https://support.google.com/websearch/answer/7585859?hl=en>

How results are automatically generated

With the vast amount of information available, finding what you need would be nearly impossible without some help sorting through it. Google's ranking systems are designed to do just that: sort through hundreds of billions of webpages and other content in our Search index to present the most relevant, useful results in a fraction of a second.



Key factors in your results

To give you the most useful information, Search algorithms look at many factors and signals, including the words of your query, relevance and usability of pages, expertise of sources, and your location and settings. The weight applied to each factor varies

depending on the nature of your query. For example, the freshness of the content plays a bigger role in answering queries about current news topics than it does about dictionary definitions.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

Search also includes some features that personalize results based on the activity in your Google account. For example, if you search for “events near me” Google may tailor some recommendations to event categories we think you may be interested in.

These systems are designed to match your interests, but they are not designed to infer sensitive characteristics like your race, religion, or political party.

You can control what Search activity is used to improve your Search experience, including adjusting what data is saved to your Google account, at myaccount.google.com. To disable Search personalization based on activity in your account, turn off Web & App Activity.

You can also find content preferences like SafeSearch in settings. These help you make a choice about whether search results include graphic content that may be shocking for some users.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

Beyond looking at keywords, our systems also analyze if content is relevant to a query in other ways. We also use aggregated and anonymized interaction data to assess whether search results are relevant to queries. We transform that data into signals that help our machine-learned systems better estimate relevance. Just think: when you search for “dogs”, you likely don’t want a page with the word “dogs” on it hundreds of times. With that in mind, algorithms assess if a page contains other relevant content beyond the keyword “dogs” — such as pictures of dogs, videos, or even a list of breeds.

It’s important to note that, while our systems do look for these kind of quantifiable signals to assess relevance, they are not designed to analyze subjective concepts such as the viewpoint or political leaning of a page’s content.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

How are videos ranked in Search?

Like Google's search engine, YouTube search strives to surface the most relevant results according to keyword searches. Videos are ranked based on the following factors:

- How well the title, description, and video content match the viewer's search.
- What videos drive the most engagement for a search.

Note: Search results are not a list of the most-viewed videos for a given search.

How are videos ranked on Home?

Home is what your audience sees when they open the YouTube app or visit YouTube.com. It's where we aim to deliver the most relevant, personalized recommendations to each viewer. When your audience visits Home, YouTube displays videos from subscriptions. Videos watched by similar viewers and new videos are also shown. The selection of videos is based on:

- **Performance** -- How well your video has interested and satisfied similar viewers, among other factors.
- **Watch and search history** -- How often your audience watches a channel or topic and how many times we've already shown each video.

Source: <https://support.google.com/youtube/answer/141805?hl=en#zippy=%2Chow-are-videos-ranked-in-search>

Manage your recommendations and search results

Your activity on YouTube, Google, and Chrome may influence your YouTube search results, recommendations on the home page, in-app notifications, and suggested videos among other places.

There are several ways to influence these recommendations and search results. You can remove specific videos from your [watch history](#) and searches from your search history. You can also pause your watch and search history, or start fresh by clearing your watch and search history.

Watch history and search history

- **Remove individual videos from your watch history:** If you notice recommendations on a subject you're not interested in, try removing a video you previously watched on that topic. It may reduce the chance of similar recommendations in the future.
- **Remove individual searches from your search history:** If you notice recommendations on a subject you're not interested in, try removing a previous search on that topic. It may reduce the chance of similar recommendations in the future.
- **Pause history:** You can pause your watch or search history when you don't want your watches or searches to influence future recommendations and search results. For example, when you're researching a subject for a school project that you aren't personally interested in. Remember to resume your history when you're done.
- **Clear history:** If your entire watch and search histories are no longer relevant to your interests, you can clear your search and watch histories. **Tip:** If you want to use your watch history to re-watch some videos, try adding those videos to a playlist or "Watch Later" to find them again.

Source: <https://support.google.com/youtube/answer/6342839>

<p>adjusting weights of at least some of the tags based on an association relative to tags within the same category of tags to which the subsequent digital image belongs;</p>	<p>Plaintiff contends that as users reinforce and expand their profile of preferences, automatically displayed content will gravitate towards that which has been demonstrated to have the most positive responses by the user.</p> <p>Google's search engine uses a ranking system that acts as a weighting system. The ranking system is an aggregate of different factors such as user's query, relevance, usability of pages, expertise of sources, freshness, and users' location and settings. Weights of each factor depend on the nature of the query. Relevance to keywords would be one sub element in the ranking system but would still affect the ranking of potential subsequent digital images.</p> <p>Google's YouTube app uses a similar ranking system that also acts as a weighting system. The ranking system is an aggregate of different factors such as user subscriptions, videos watched by similar viewers, user engagement, user watch and search history. New and previous recommendations will include associated keyword tags.</p> <p>https://support.google.com/youtube/topic/9257532?hl=en&ref_topic=9257610 https://www.google.com/search/howsearchworks/how-search-works/ranking-results/#relevance</p> <p>https://developers.google.com/search/docs/appearance/structured-data/image-license-metadata?visit_id=638029268757455422-1184707528&rd=1</p> <p>https://developers.google.com/search/docs/appearance/google-images#use-descriptive-alt-text</p> <p>https://developers.google.com/search/docs/appearance/google-images</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>
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Google Search consumer information

When you search on Google, ranking systems sort through billions of web pages in our Search index to give you useful information in a fraction of a second.

These ranking systems are made up of a series of algorithms that analyze what it is you're looking for and what information to return to you. And as we've evolved Search to make it more useful, we've refined our algorithms to assess your searches and the results in finer detail to make our services work better for you.

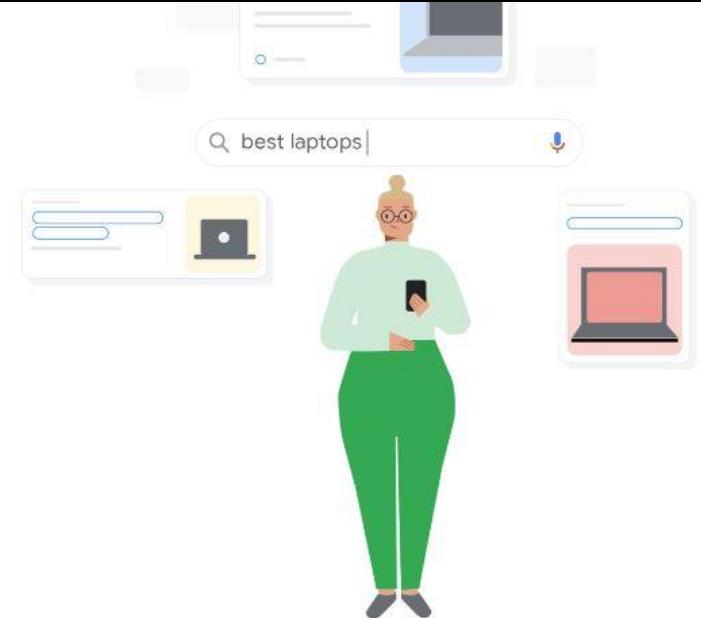
To give you the most useful information, Search algorithms look at many factors, including the words of your query, relevance and usability of pages, expertise of sources, and your location and settings. The weight applied to each factor varies depending on the nature of your query—for example, the freshness of the content plays a bigger role in answering queries about current news topics than it does about dictionary definitions.

To ensure you can trust how Google ranks results, we never accept payment to be included in search results or to be ranked higher in search results. We believe relevant ads can be as useful as actual search results, but we don't want anyone to be confused about which is which. When we do show ads, they're always clearly labeled. We show ads only when we believe they're relevant to the search terms you've entered and could be useful to your search. If we have no relevant ads, we show no ads at all. To learn more about why a Search ad is relevant: Click Info

Source: <https://support.google.com/websearch/answer/7585859?hl=en>

How results are automatically generated

With the vast amount of information available, finding what you need would be nearly impossible without some help sorting through it. Google's ranking systems are designed to do just that: sort through hundreds of billions of webpages and other content in our Search index to present the most relevant, useful results in a fraction of a second.



Key factors in your results

To give you the most useful information, Search algorithms look at many factors and signals, including the words of your query, relevance and usability of pages, expertise of sources, and your location and settings. The weight applied to each factor varies

depending on the nature of your query. For example, the freshness of the content plays a bigger role in answering queries about current news topics than it does about dictionary definitions.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

Search also includes some features that personalize results based on the activity in your Google account. For example, if you search for “events near me” Google may tailor some recommendations to event categories we think you may be interested in.

These systems are designed to match your interests, but they are not designed to infer sensitive characteristics like your race, religion, or political party.

You can control what Search activity is used to improve your Search experience, including adjusting what data is saved to your Google account, at myaccount.google.com. To disable Search personalization based on activity in your account, turn off Web & App Activity.

You can also find content preferences like SafeSearch in settings. These help you make a choice about whether search results include graphic content that may be shocking for some users.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

Beyond looking at keywords, our systems also analyze if content is relevant to a query in other ways. We also use aggregated and anonymized interaction data to assess whether search results are relevant to queries. We transform that data into signals that help our machine-learned systems better estimate relevance. Just think: when you search for “dogs”, you likely don’t want a page with the word “dogs” on it hundreds of times. With that in mind, algorithms assess if a page contains other relevant content beyond the keyword “dogs” — such as pictures of dogs, videos, or even a list of breeds.

It’s important to note that, while our systems do look for these kind of quantifiable signals to assess relevance, they are not designed to analyze subjective concepts such as the viewpoint or political leaning of a page’s content.

Source: <https://www.google.com/search/howsearchworks/how-search-works/ranking-results/>

How are videos ranked in Search?



Like Google's search engine, YouTube search strives to surface the most relevant results according to keyword searches. Videos are ranked based on the following factors:

- How well the title, description, and video content match the viewer's search.
- What videos drive the most engagement for a search.

Note: Search results are not a list of the most-viewed videos for a given search.

How are videos ranked on Home?



Home is what your audience sees when they open the YouTube app or visit YouTube.com. It's where we aim to deliver the most relevant, personalized recommendations to each viewer. When your audience visits Home, YouTube displays videos from subscriptions. Videos watched by similar viewers and new videos are also shown. The selection of videos is based on:

- **Performance** -- How well your video has interested and satisfied similar viewers, among other factors.
- **Watch and search history** -- How often your audience watches a channel or topic and how many times we've already shown each video.

Source: <https://support.google.com/youtube/answer/141805?hl=en#zippy=%2Chow-are-videos-ranked-in-search>

Manage your recommendations and search results

Your activity on YouTube, Google, and Chrome may influence your YouTube search results, recommendations on the home page, in-app notifications, and suggested videos among other places.

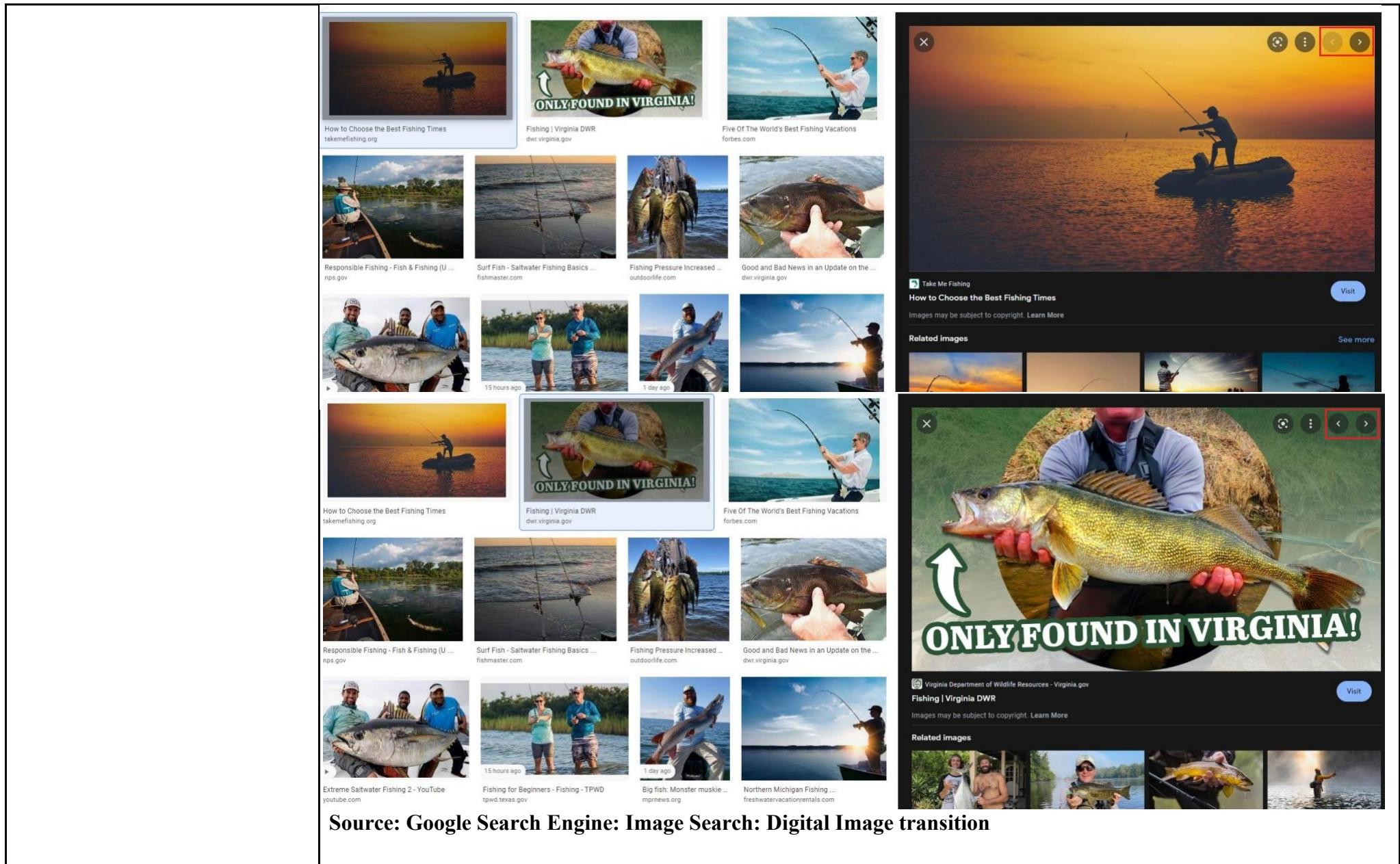
There are several ways to influence these recommendations and search results. You can remove specific videos from your [watch history](#) and searches from your search history. You can also pause your watch and search history, or start fresh by clearing your watch and search history.

Watch history and search history

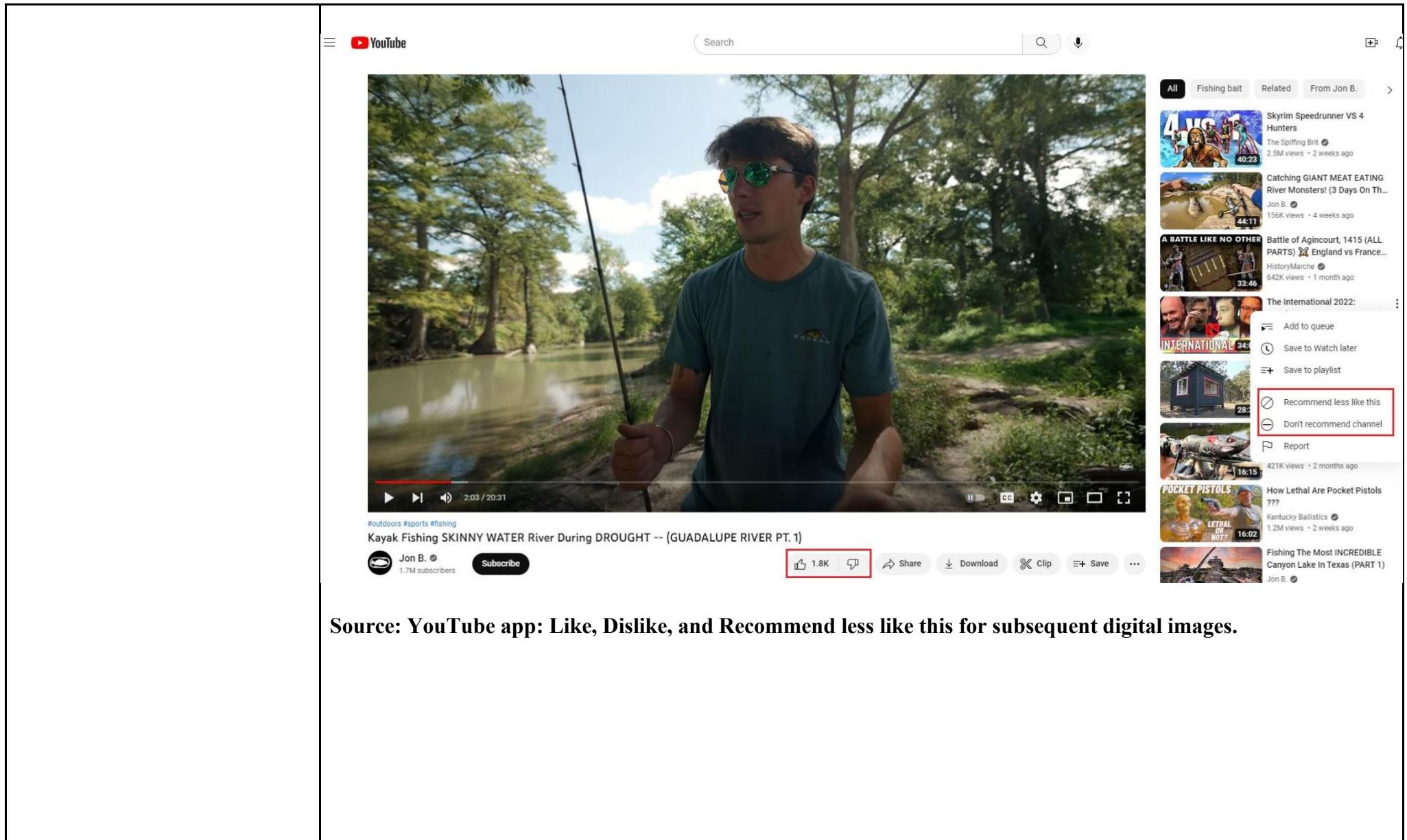
- **Remove individual videos from your watch history:** If you notice recommendations on a subject you're not interested in, try removing a video you previously watched on that topic. It may reduce the chance of similar recommendations in the future.
- **Remove individual searches from your search history:** If you notice recommendations on a subject you're not interested in, try removing a previous search on that topic. It may reduce the chance of similar recommendations in the future.
- **Pause history:** You can pause your watch or search history when you don't want your watches or searches to influence future recommendations and search results. For example, when you're researching a subject for a school project that you aren't personally interested in. Remember to resume your history when you're done.
- **Clear history:** If your entire watch and search histories are no longer relevant to your interests, you can clear your search and watch histories. **Tip:** If you want to use your watch history to re-watch some videos, try adding those videos to a playlist or "Watch Later" to find them again.

Source: <https://support.google.com/youtube/answer/6342839>

transitioning the one of the digital images with the subsequent digital image on the video display device to replace the one of the digital images with the subsequent digital image on the video display device;	<p>Plaintiff contends that Google's search engine and YouTube app will display digital images and transition to subsequent digital images on a user's video display device.</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>
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<p>and receiving via the user input device a further input corresponding to one of the at least two input options including a favorable indication for the subsequent digital image and an unfavorable indication for the subsequent digital image.</p>	<p>The plaintiff contends that Google's YouTube service offers users the ability have the option of selecting 'Recommend less like this' on any subsequent post, including digital images, and that the YouTube app will "suggest fewer posts like this" based off that disinterest. In addition, YouTube app users will have the ability to indicate favor for any post including, digital images using the like option. Users will also have the ability to indicate disfavor for any post including digital images using the dislike option.</p> <p>Content pertaining to tags that are perceived as negative will be less likely to be shown to that specific user. Negative engagement factors such as use of 'Recommend less like this' or dislikes decrease the posts rank in the Google's content ranking algorithm. Content with associated factors such as tags may be affected in future candidate selection. Content that has been liked by a user will rank higher in Google's selection algorithm. Thus, posts with higher positive engagement factors such as likes are more likely to have associated factors like tags have higher preference in Google's content ranking algorithm.</p> <p>The following exemplifies the existence of this limitation in Accused Systems:</p>
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Source: YouTube app: Like, Dislike, and Recommend less like this for subsequent digital images.